PHOTON-PARTICLE, PHOTON-WAVE

OR DUALITY - PHOTON ?

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Abstract

**Distance** is the Quantum of E-Geometry, while **Material-point** is the Quantum in **Physics** and **Material-Geometry** which is the composition of opposites and are the Elements in **Chemistry and Physics**. As in **Algebra** zero ,0, is the **Master-key** number for all Positive and Negative numbers, because their sum and multiplication is zero , and the same on coordinate-system ± axes pass from zero, The Rolling of Positive ⊕, constituent on the Negative ⊖, constituent, creates the Neutral Material point which Equilibrium. **Spin B**, is Its Angular momentum and the **First-Discrete-Energy-monald** which occupies **Discrete-Value and Direction**, in contradiction to the Point which is nothing, **Dimensionless** and without any **Direction**.

**Space is Quantized as Energy-Caves** under the effect of Gravitational-force **G**, and Energy is Quantized as **Frequency** in **Energy-Caves** following Kepler’s First-law of equal areas in equal intervals. **Quaternion** [(+)∪(-)] is a Quantum-Mould for Space [(+)(-)] and Energy= motion = Force x Displacement as [∪∪∪∪∪∪∪∪] = Box BQ = An Material Point which carries the Principal Stress σ between A(+), B(-), and σ is **Centripetal-acceleration** of minimum Energy becoming from the in-storage AB acceleration and which is equal to the Gravity g.

From Quaternion Quantum-Mould [r + Vi]^{1/w} = e^{-i(π/2+2krn)},w is created the min-cave r = 1.07.10^-7 m and the min-energy v = w r = 2π f, The frequency f_m = 2,839844. 10^-10 Hz. Gravitational-force G effecting on light velocity ĉ creates Electron-charge ĝ̅ and Electron ē̅, while acting on Planck’s-cave the Gravity g = ± σ, as G = g k = k_1 g = g_2 k, g_3 g = ± σ, g, g_1, k_1, g and g effecting on the min-Planck-cave Lp formulates Hydrogen-cave H with its electron He.

**Constant G** is effecting on Gravity g and in turn g, effects on Electron ē of **Hydrogen-cave**, Originates Nutation-motion in Precession as Resonance-frequency f_N ≡ f_R≡ Work ≡ Energy, and is stored in the [Nucleus-Electron] Orbit, as the w_L Larmor – frequency. Moreover A... The Link between G and all above is the Photon [Particle-Wave] which as Particle is an Confined f_N in a Stationary-Wave-Storage, and as Wave an Propagating Electromagnetic-Wave. B... The United Coulomb-Newton-Law of Interactions is the Extreme case of any two Touched Charges in Field E, as k(q_1, q_2) = g E, producing the Nutation of Orbit-Electrons.

C... Atom is a cave containing a Hep of masses and Charges. This configuration forms a Harmonic Oscillator which creates an Electromagnetic Wave, the Quantum of Energy and of Space, which are the Natural-frequency of Atom f_1, and the Storage Magnetic-field B_L.

**Keywords**: The Duality Photon, The Constancy of light-velocity, Atoms-Nutation-motion.
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A. GENERAL

1...The Objective Reality is composed of two elements, that of Distance, the Space ds, and that of Motion, or else called Energy, and it is the content of all sciences [32]

2... Euclidean-Geometry describes the Space only but Not the Energy [48].

3...The Solution of all the Unsolved-Ancient-Greek-Problems [50] opened the way to Material-Geometry [54] which Incorporates the Motion In-Space (⊕ ↔ ⊖), [61]. The Space exists in Energy-Caves as Energy-Quantum-Quantities [39] while Motion or Energy exist in Caves as an Confined-Stationary-wave which is either Static or an moving Energy-Storage or an Energy-Box [68]. The Two Opposites (+), (-) exist in Nature and are found everywhere from → Zero-Point (0) ≡ [+-] or (+A)+(-A) = 0 in E-Geometry and → [0] = [⊕ ↔ ⊖] ≡ ds , [⊕ ↔ ds ↔ ⊖] in Material-Geometry, to the aperon, ± ∞, where, in The Space ≡ ds, the motion exist as Vibration [52].

4...The Primary-Material-Point is composed of Infinite-Material-Points in the Two-Aperon which consist a Huge Magnet with Infinite Parallel-lines, where the ⊕ constituent moves as for Newton-Gravitational-constant G-force Periodically to ⊖ constituent [82-86].

5... Gravitational-Force G, Acting in the Beyond-Planck - Cave, and on the light Velocity Vector ĉ, creates Electron-Charge ĝElectron = \( \frac{G}{c \sqrt{2}} \) and the Material-Points ĝPhoton = \( \frac{G}{\sqrt{2}f} \) while by effecting on the Whole-Planck-Cave L_p = e^{i \cdot (\gamma \cdot 2 \pi t)} \cdot \frac{10}{1}, creates the Pointy-Gravity Force as this is the Ocean of Spins ĝ, and which Oriented-Spins, Originates the Gravity g and Electron ĝ [72].

6...The Rotation of the Two Elements, [⊕ ↔ ⊖], Up or Down in the Material-Point-circles Originates the Spins, ± 1/2, ± 1, ± 1/2, for All-Particles Fermons or Bosons which become from above Three-States of motions, just by Adding the Spins [36]. Linear Motion [⊕ ↔ ⊖] of Breakage [± ĉ]. s_m² in cave \( M\text{-Point} = d s_m = e^{i \cdot (\frac{N}{2})} = 10 - N = ± \infty \) as → v = w r = 2πr. f = σ. φ, in the Great and Small circles of Glue-Bond rotation creates the Three-States of frequencies \( f_{±1/2} = \frac{1+\sqrt{5}}{2\pi} \), \( f_{±1} = \frac{1+\sqrt{5}}{4\pi} \), \( f_{±1/2} = \frac{1+\sqrt{5}}{8\pi} \), and energy E = h f_m .

Because Angular-Momentum B = \( \frac{2L}{w} = \frac{2L}{2\pi f} = [\frac{2L}{2\pi}] \cdot \frac{1}{f} \), constant \( \frac{1}{f_m} = \text{SPIN} \) [70]

7...When the Unit-Quantum-Energy in Planck-length is equal to the Stress of Gravity g, and enters the minimum-cave a as the Critical-Unit in orbit, then is measured frequency \( f_p \) which is giving the Least-Unit-Energy-cave and that is of Hydrogen - Cave H, [81], as equations g . a . f²_p = 1 and E = h f_p .

8...When the Unit-Quantum-Energy k in Planck-length is equal to the Stress of Gravity g and frequency \( f_e \) becomes from Hydrogen Least-Unit-Energy = πg, then Reaction = mass Photon Particle, Photon Wave OR The Duality Photon ???
is that of the Electron Cave, as \(4\pi^2 f_e m_e = k = \pi g\) and \(m_e = g / [4\pi^2 f_e]\), [82]

9...The Rotation around the \(\oplus\) constituent, of the Confined-Electron \(\ominus\) constituent in the Potential-Energy of Hydrogen-cave, which consists a configuration of masses \(m_p\) and of Charges \(q_e\), Originates, the Uniform-Magnetic-field \(\vec{B}_L\) of Atom, the Spin of Atom connected with that of Electron-Spin, and Forms an Harmonic Oscillator with a Natural Frequency \(f_N\) with the less Damping-factor by Increasing of Potential Energy in loop due to Nutation-motion. Since Electron is continually-oscillating with the Nutation-frequency \(f_N\), so Produces an oscillating magnetic-field \(\vec{B}_N\), which in turn is the source of an oscillating Electric-field \(\vec{E}_N\), which implies the Regeneration each other and which is a Propagating Electromagnetic - Wave where \(\vec{E}_N = \vec{B}_N c\). [86]

10...This Resonance - frequency \(f_R\) is Independent of the Electron’s speed and radius so allows Bonding between Atom-caves which contain a Formation , a Heap of Masses and of Charges. In a Proper- Stationary-Magnet on which the Rotation-motion becomes as linear Oscillation is succeeded a clear Magnetic-Resonance-Imaging [The MRI, MEDIA], [86].

11... Constant force \(G\) is effecting on Gravity \(g\), and in turn \(g\) is acting on Electron \(\vec{e}\) in the Hydrogen-cave, Originates the Nutation-motion in Precession as Cyclotron-Resonance - frequency \(f_R = \frac{\sqrt{1 - \left(\frac{1}{4\pi^2 m_e r^3}\right)}}{4\pi^2 m_e r^3}\) of cave \(r\), and the produced-Energy \(\equiv\) motion is stored in the Orbit as a New Uniform-Magnetic-field \(\vec{B}_f = \frac{2\pi M_T f_R}{Q_T}\) independent of velocity and cave, which becomes the Bond between the Atoms to be Molecules, i.e. Bonds are the Magnetic-lines of the Uniform-field. [80]

12...During Nutation of Electron-SPIN, and because of the Eternal-Varying-Velocity motion in Orbit Precesses, the Produced-Work of \(\oplus =\) Proton, \(\ominus =\) Electron] is Conserved in the Nucleus-Orbit-Magnet, as the Nucleus-Magnetic-Moment, which is influenced by Any External-Magnetic-field. The continually Conserved Energy becomes the frequency \(f_N = f_R\) and is Resonated to the Electron-Spin, OR to the Set External-Magnetic-Field-moment. [N] Articles IN - GOOGLE \(\rightarrow\) by Georgallides Markos.

13... The Priors:

Article [87] is the completion of [72-80] and [80-86] of the Physical interpretation of the Two constants of nature, that of Newton’s Gravitational constant \(G\), and light velocity \(c\), with Derivatives the Photon-Charge \(\vec{q}_{\text{photon}}\) in Material Point cave \(r\), Gravity Constant \(g\), and Planck constant \(L_P\), with a Rigorous Geometrical and Mechanical logic.

It was shown [33-39] that from < The Balancing of Space, Anti-Space in a Rotating Sub-Space Common circle > Un-clashed Fragments through center \(O\), consist the Medium-Field Material-Fragment \(\rightarrow [\pm s^2] = \{\text{MFMF}\} \equiv \text{The Chaos}\), as base for all motions, and Gravity as force \(\vec{V}_i\), while the clashed with the constant velocity \(\vec{c}\), consist the Dark matter \([\pm\vec{c}.s^2]\) and the Dark energy \([\vec{c}.\vec{V}_i]\), Declaring that \(\rightarrow\) Antimatter-Galaxies and Antimatter-Asteroids can exist only as Dark-matter or and Dark-Energy and NOT as Antimatter light, (- \(e\)) alone, or from \(\rightarrow\) velocity - Breakages, \([\pm s^2 = \pm (wr)^2]\) and \([\vec{V}_i = 2(wr)^2]\), where then become the Waves \{ On distance \(d = [\lambda A]\) is the Work embedded in monads and it is what is vibrated \} and the Material-Points with their Vibrating equations of motion. Vibration is the motion in Waves and is transported as Electromagnetic-Radiation. For Photon-Material-Point exists the

Duality of an Energy-Storage \(S = [\oplus \leftrightarrow r \rightarrow \ominus]\) + Motion \(M = \vec{V} - \text{Vector}\) as [87].

Photon Particle, Photon Wave OR The Duality Photon ???
From vibration in Material-Points become ,

A  → Particles , with Inherent Vibration occupying distance  \( r = ds = |AA_{E}| \),
B  → Gravity-Field-Energy without Vibration , the only Stationary-Rotating Photon-Spinning-Material-points .
C  → Dark-matter-Energy constituents as below ,

A.  \([±\vec{v}.s^2]\)  → Fermions , Quarks and Leptons , and \(→ [±\vec{v}.\vec{v}] \) → Bosons ,
B.  \([±s^2]\)  → [MFMF] Neutral Field ≡ The Equilibrium Energy - Chaos , with the Negative-Energy binder Field \([\vec{v}.\vec{v}] \) → The Gravity force \(G_f \)
C.  \([±\vec{c}.s^2]\)  → Dark-matter , and the binder Gravity-force \([\vec{v}.\vec{v}] \) , \([\vec{c}.\vec{v}] \) → The Expanding Dark Energy , Positive-Energy , which both are moving with light velocity , \(c\) , causing the Universe to grow.

From above in , A , and ,C , case  → Energy as velocity \(\vec{v}\) , and , \(\vec{c}\) , exists in the . Quantized . Discrete monads , \(±\vec{v}.s^2\) and \(±\vec{c}.s^2\).

B , case is the Transportation of Energy , from Chaos to Stationary Material points .

Dark Energy \(DE ≡ [\vec{c}.\vec{v}]\) (©) → Acting , is Positive-Energy , on the Five Constituents →

\[ \{ [ (\vec{v}.\vec{v}), (+s^2), (-s^2), (+cs^2), (-cs^2) ] \} \] Produces

\([±s^2]\)  → MFMF Field \([±\vec{c}.s^2]\) → DM-DE Field of , Dark matter and Anti-matter

\([±\vec{v}.s^2]\)  → Fermions \([\vec{v}.\vec{v}] \) → \(G_f \) ≡ Gravity-Force in DM-DE Stationary Field .

\([\vec{v}.\vec{v}] \) → Bosons , \([\vec{c}.\vec{v}] \) → DE → Dark Energy \(c \times (©) [\vec{v}.\vec{v}] \)

→ Gravity Force \(DE ≡ [\vec{c}.\vec{v}] = \vec{c}[\vec{v}] = \) The Travelling-Energy-cave , \(c\) ,
with the velocity-vector , \(\vec{c}\) ,

In all above issue Kepler-laws , denoting that Macrocosm and Microcosm Obey Newton’s Laws of motion in all Scales , as this was in prior proofed . [56]

In [68] is shown that Motion may be Linear or Rotational for any displacement , \(r\) , so exists a Constant -Work = \(k\) , during these motions of velocities \(\vec{v}\) , and since Energy is vectors then \(k = \vec{v} \cdot \vec{r} = \vec{v}^2.\vec{r}\). \(\vec{n} \cdot = v^2. r = (wr)^2. r = \frac{2\pi}{T} r = \frac{4\pi^2 r^6}{T^6} \) . \(r = \frac{4\pi^2 r^6}{T^6} = 4\pi^2 r^6 = 4\pi^2 r^6 f_p^2 \) i.e. Above constant work \(k\) , is composed of the Two velocity vectors \(\vec{v}\) which are , One for the Space-motion-monad \(r\) , and one for the Energy-motion-monad \(4\pi^2 r^6 f_p^2 \) \(= [2\pi f r] \) \(= [\pi f r^2] \) \(= \vec{v}^2\).

For Photon during Motion in [MFMF] ≡ Chaos , collides with other Photons by means of Cross - Product and Produces a constant Work which is stored into the Only-Four Energy - Geometrical - Shapes , of the motion which shapes are the Conic – sections .

The Interior motion is kept in its Wavelength-Tank \(2\pi = n\lambda\) , as well as the Outer-Linear motion as an Propagating Electromagnetic-Wave , which carries the Energy-conveyor , i.e. The stored energy in the loop is → \(W_l = v^2 \left[ \frac{2\pi}{2\pi} \right] = 4\pi^2 r^6 f_p^2 = k\) , where as Wave is Frequency \([f_1 = (E^2 + H^2) = n (1+\sqrt{5}) = \frac{2nB}{4nT^4}] \) and Particle as velocity \([\vec{v} = \vec{c} = \lambda f]\) and dependent on velocity \(v\) , and Planck’s constant \(h\) , or on loop \(r\) , and as frequency \(f_p\) , which is the Wave . It is proved that this minimum wave - constant → \(k = \pi g\).

For The Duality-Photon → \([\vec{c} \cdot f_n + \vec{c} \cdot f_n]\) ← is proved that ,

1. Energy-Storage \(S \equiv ([+r → +]) \equiv \) Particle \([\vec{v} \cdot f_n] \) \(→ [\vec{v} = \vec{c} = \lambda f] \)

And is an Stationary Standing - Wave → \(S \equiv EM - R \equiv [f_{1=n}, f_2, f_3, f_D, f_n = w^2]\).
2. Energy-Motion \(M \equiv [\vec{v} - Vector] \equiv Wave [\vec{v} \cdot f_n] \equiv [f_1 = (E^2 + H^2) = n (1+\sqrt{5}) = \frac{2nB}{4nT^4}] \)

and it is a Propagating Wave \(W \equiv EM - R \equiv [\vec{E}^2 + \mu B^2] = 2.\lambda c . \sin .2\phi\).

Photon Particle , Photon Wave OR The Duality Photon ???
B... THE TOTAL WORK DUE TO MOTIONS :

It was shown in [58] that the maximum velocity in a closed system occurs in Common circle, when the two velocities, \( \bar{c}, \bar{v} \) are perpendicular between them, and Work is not produced. From them a dispersion follows Pythagoras theorem and the resultant Quantized linear Space length \( r \), becomes, as the Resultant of Energy Vectors \( r = |(\bar{c}.T)| = \sqrt{v^2 + c^2} \) and by using Geometry-Space Vector \( \vec{r} = |(\bar{c}.T)| = \sqrt{v^2 + c^2} \) then The total Rotating energy \( \vec{A} \) is \( \rightarrow \pm \vec{A} = \vec{p} \cdot r = (M.c).r = (M.c).\sqrt{v^2 + c^2} \) and squaring both sides \( [\pm \vec{A}]^2 = p^2.v^2 = M^2.c^2.(v^2+c^2) \) = \( (M^2.v^2).c^2 + M^2.c^4 = (p^2.c^2) + M^2.c^4 = [\text{p c}]^2 + [\text{m}_o.c^2]^2 \) or is \( E_T = E_R + E_K \) i.e.

The Total - Energy of Elementary-particle \( \equiv \) Intrinsic Rotational + Kinetic Energy,

1b... The Beyond Planck-Scale \( r < L_p = 1.616199.10^{-35} \text{ m} \):

Preliminaries :

In [23] was shown that, Any Distance AB between Two-Points is Quantized as \( ds = |AB|/n \)

\[ [A] \quad ds = (AB/n) = 0 \]  \[ [B] \quad ds = \rightarrow AB / n = 1 \]

Continuous as Points (.)  Discrete as monads ( \( r \equiv ds = 1 \rightarrow n \) )

Work done \( (W) \) by Impulse \( (P) \) on a Virtual displacement \( (ds > 0) \) is zero, or \( W = |A-B| \) by \( |P|ds | = 0 \). Therefore, Each Unit \( AB = ds = r > 0 \) exists, by this Inner Impulse \( (P) \) and so \( PA + PB = 0 \) i.e.

The Position and Dimension of all Points which are connected across the Universe and that of Spaces exists, because of this Static Inner Impulse, on the contrary should be one Point only (Primary Point A = Black Hole \( \rightarrow ds = 0 \) and \( P = \infty \)) [70]

It was shown that in PNS, \( v = \infty \), \( T=0 \), meaning that velocity is infinite and Time is not existing and thus any length \( |AB| \) in [PNS] is constant, because \( AB = ds = Constant = v \cdot 0 = \infty .0 \). Straight line \( AB \) is discontinuous (discrete) with dimensional Units \( ds = AB / n \) where \( n = 1 \rightarrow \infty \), and continuous with points \( [ds = 0] \), (This is the Dual Nature of lines in, geometry, as discrete and continuous).

From definition work \( W = Force \times Distance \equiv Momentum [mv] \times Distance [r] \equiv mv \cdot r \) or \( W = mv \cdot r \), exists Work where \( 1 \rightarrow r \) Becomes from Material-Geometry where the Quantization of Space for the Rotated Energy case \( (s = 0 \) and \( \cos \phi = 0) \), In-Primary-Quaternion \[ s + v \bar{v} i \] \( 1/w = e^{-i(\pi/2+2\kappa)w} \) \{for angle \( \phi = \pi/2 \), dimension power \( w = b = 10 \) and \( k = 0 \)\} exists the minimum-Energy-Cave \( r \). For base \( e = 2.71828 \) and base \( b = 10 \) then \( e^w \cdot (16,1181) = 1 .10^{-7} \) or \( r = 1.07.10^{-7} m \)

\( r_{min} = 1.07.10^{-7} m \) \( \rightarrow \) i.e. \( r_{min} \equiv \) The minimum Energy-Space-Cave \( \equiv \) Space-Quantum.

Placing the \( r_{min} \) in the Dynamic-Space-Energy relation, \( g . r^3.f^2_p = 1 \) when \( g = l \), then, \( f^2_p = \frac{1}{r^3} = 8.0647139.10^{-20} \text{ m} \), or \( f_{min} = 2.838944.10^{10} H \) is the minimum Energy in Cave,

\( f \rightarrow f = f_{min} = 2.839844.10^{10} H \) \( \equiv \) The minimum Energy in Cave \( \equiv \) The-Energy-Quantum

From wavelength-relation \( n \lambda = 2r = n w \text{f} \), exists \( v = \lambda \text{f} \) or \( \rightarrow \vec{v} = \vec{c} = \lambda \text{f} \) and since \( v = w = [2\pi/T] \cdot r = 2\pi.f_1.r \), wavelength \( \lambda = c T = c / f_1 \), and from cave \( r = n.\lambda \) then \( v = 2\pi.f_1.n \cdot \text{c} / 2f_1 \) \( \equiv n.\pi.c \) or \( v = n.\pi.c \) i.e.\( \rightarrow \) The Quantum of velocity is constant c.
From Constant-Energy Orbit-relation \( k = (\mathbf{v} \times \mathbf{v}) \cdot \mathbf{r} = v^2 \), \( r = (w \cdot r)^2 = \frac{2\pi}{1} r^2 \), \( r = 4\pi^2 r^4 = 4\pi^2 r^4 \), \( r = \frac{4\pi^2 r^3}{r^2} = 4\pi^2 r^2 \) the minimal mass is \( [2\pi r]^2 \cdot r = [n\pi c]^2 \cdot r \equiv \text{Kepler Universal Laws for macrocosm and microcosm} \).

Frequency \( \rightarrow f_{\text{min}} \) becomes from velocity relation \( v = w r = 2\pi f r \), as \( f_{\text{min}} = \frac{v}{2\pi r_{\text{min}}} = \frac{v}{2\pi r_{\text{min}}} \). or

\[
f_{\text{min}} = \frac{v}{2\pi r_{\text{min}}} = \frac{n\pi c}{2\pi r_{\text{min}}} = \frac{n c}{2\pi r_{\text{min}}} = \frac{2\pi^4 r^5}{21.07.10^{-7}} = 1.4009345.10^{14} \quad \text{H}
\]

From momentum relation \( B = m r v = m r^2 w = m r^2 (2\pi f) = \frac{1}{2} w = \left[ \frac{\pi r^2}{4} \right], \) then the Mass of the elementary particles is \( m = \frac{\pi r^2}{4} = \frac{\pi(1.07.10^{-7})^2}{4} = 8.992023.10^{-15} \text{ Kg} \), or

\[3\ldots \rightarrow m = m_{\text{min}} = 8.992023.10^{-15} \text{ Kg} \quad \text{while from} \quad B = r m v = \frac{\pi r^4 f}{2}, \text{then Planck mass} \]

\[ m = \frac{\pi r^4 f}{2 v} = \frac{\pi^2 (1.07.10^{-7})^2}{2} \cdot 1.4009345.10^{14} = 2.8248572.10^{-15} \text{ Kg} = m_{\text{min}} / \pi
\]

Quantization, \( for \ k = 1 \), is the Planck-minimum-Energy-Scale Decimal-Cave \( L_{\text{min}} = L_p \)

\[ L_p = e^{i (\frac{B(2+2\pi)}{r})} b = e^{i (-\frac{\pi}{r})} 10 = e^{-70.5398} = 8,906.10^{-35} m = \sqrt{3}\pi.1,616199.10^{-35} m \]

From [70] the velocity of Elementary particles is the light velocity-vector. \( c = \mathbf{v} = 2\pi r, f_e \) and the frequency \( f_e = \frac{c}{2\pi r} \ldots \quad (1) \). The Balancing of Space and Anti-Space in a Rotating Sub-Space Common circle happens from the \( [ \pm ] \) equilibrium- Rotational-Energy as relation

\[ \mathbf{B} \mathbf{= \mathbf{L} = \frac{1}{2} J_1 w_1^2 + \frac{1}{2} J_2 w_2^2 + \frac{1}{2} J_3 w_3^2} \quad \text{or A-momentum} \quad \mathbf{B} = \frac{J w}{2} = \frac{\pi r^2}{4} \left[ 2\pi f \right] = \frac{\pi r^4}{4} \left[ f \right] \ldots \quad (2)
\]

\[ \text{Frequency} \quad f = 2B \left( \frac{1}{\pi r^4} \right) = \frac{2B}{\pi r^4} = \frac{1 + \frac{\sqrt{5}}{4\pi}}{\pi r^4} \rightarrow \frac{c}{2\pi r} = \Phi \sigma \quad \text{or} \quad 2\Phi \frac{(1 + \frac{\sqrt{5}}{4\pi}) \sigma}{2\pi r^4} \ldots \quad (3) \]

A-momentum \( \mathbf{B} = \frac{[1 + \frac{\sqrt{5}}{4\pi}] \sigma \pi r^3}{2} \), \text{where Unit-energy-constant} \quad \frac{T^2}{a^2} = k = \frac{4\pi^2}{G.m} \quad \text{or} \quad k a^3 = 1
\]

The Rotational energy is \( \rightarrow E_R = \mathbf{B} \cdot \mathbf{v} = 2L = J w = J c^2 \quad \rightarrow \frac{\pi r^4}{2} = \frac{\pi r^2}{2} \quad \text{......} \quad (5) \]

Mass is the Reaction to any motion or change and is measured by the cave-moment of Inertia \( J \). Energy and frequency of Elementary particles can be found from cave \( r \) only since \( c \), is constant. \textbf{Total-Energy} \( \rightarrow E = E_T = E_R + E_k = \frac{\pi r^2}{2} + \frac{1}{2} m \cdot v^2 = 1,41118323.10^{16} \cdot r^2 + \frac{1}{2} m \cdot v^2 \ldots \quad (5a) \)

Since Total-Energy \( L = B w = \frac{1}{2} w \) then \( 2L = J w \), and \( B = r.m.v = \frac{\pi r^4}{2} \cdot 2\pi f = \frac{\pi r^4}{1} f \)

From momentum relation \( B = m r v = m r^2 w = m r^2 (2\pi f) = \frac{1}{2} w = \left[ \frac{3r^4}{4} \right], \) then the Mass of the elementary particles is \( m = \frac{\pi r^2}{2}, \) i.e. is dependent on the radius of cave and for Gravity cavity \( r = 10^{-62} m \), then \textbf{Material-Points mass} \( \rightarrow m = \frac{\pi 10^{-124}}{2} = 1,570796.10^{-124} \text{ Kg} \).

However from \( J_1 w_1^2 + J_2 w_2^2 + J_3 w_3^2 = 2L \) then \( w_1^2 + w_2^2 + w_3^2 = \frac{2L}{J} = \frac{4L}{\pi r^4} = B w = 2\pi f.B \)

Angular-velocity-momentum-Ellipsoid \( L = \frac{B_1^2}{2J_1} + \frac{B_2^2}{2J_2} + \frac{B_3^2}{2J_3} \), where \( B_1, B_2, B_3 \) are the components of the Angular-momentum-vector along the Principal axes, and \( J_1, J_2, J_3 \) are the Principal moments of Inertia. Issues also \( B^2 = 2LJ = 2L \left( \frac{\pi r^4}{2} \right) = \pi L r^4 \) and \( \pi L = B^2 r^4 \).

\textbf{2b. In Planck’s Scale , length} \( r = L_p = 1,616199.10^{-35} m \) velocity \( v = c \):

Mass is the Reaction to any change of motion or change, and is measured by Kg.

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Photon Particle, Photon Wave OR The Duality Photon ???
From velocity relation \( c = \omega \tau = 2\pi \tau f \), frequency \( f = \frac{c}{2\pi \tau} = \frac{99810^8}{2\pi \cdot 1.616199 \cdot 10^{-35}} = 2.95236210^4 \) Hz and Period \( T = \frac{2\pi \tau}{c} = 3.871 \times 10^{-43} \). From Angular momentum \( \vec{B} = \vec{r} \cdot \vec{v} = \frac{\pi^2 \tau f}{v} \) then mass \( m = \frac{\pi \pi^2 \tau f}{v} = \frac{\pi^2 \tau f}{2} = \frac{\pi \cdot 1.616199 \cdot 10^{-35}}{2} = 4.103075610^{-70} \) Kg \\

Stress \( \sigma \) from above equation \( \vec{f}' = \frac{n \cdot \vec{F}}{2\pi \tau} \) is \( \sigma = \frac{2\pi \tau f}{2\pi \tau f} = \frac{\pi \cdot 1.616199 \cdot 10^{-35} \cdot 2.95236210^4}{1.6180339} = 1.846462 \cdot 10^6 t/m^2 = 1.846462 \cdot 10^{11} \) Kg/m², and Angular velocity \( |\omega| = \frac{\sigma}{2\tau} [1 + \sqrt{5}] = |\omega| = 1.5 \cdot 10^4 \) rad/sec, and the constant figure of Energy is that of Stress \( \sigma = 1.846462 \cdot 10^{11} \) Joule.

Velocities in caves become from equation \( \vec{v}^2 = \frac{2}{m} \left[ E - \left( \frac{k}{r} + \frac{\tau^2}{2m} \right) \right] \) \( = [4\pi^2, k] \cdot \left[ \frac{1 + \sqrt{5}}{2} \right] \) where constant \( k = a^2 \), Is the Energy executed by the radius \( r = \) Focus-Planet, in a second, and which is The Quantum of Energy in Cave-Orbit. From \( E_T = E_K + E_R \), then the Total energy in cave is \( E = \frac{m v^2}{2} + \left( \frac{k}{r} + \frac{\tau^2}{2m} \right) \) where \( L = S \) is the Spin of Particles. From Mechanics The One degree of freedom Vibration of a mass \( m \), and Stiffness \( k \), in a distance \( a \), is for \( w^2 = \left( \frac{k}{m} \right) \) from equation \( m \dot{x} + w^2 x = 0 \), with solution → the Period \( T = 2\pi \sqrt{\frac{m}{k}} \), frequency \( f_h = \frac{1}{2\pi} \sqrt{\frac{k}{m}} \), and Energy \( E = h f_h \), where \( h = \) Planck’s constant, and from Orbit-equation \( \vec{v} = \sqrt{\frac{2}{m} \left[ E - \left( \frac{k}{r} + \frac{s^2}{2m} \right) \right]} \) and for \( v = c \) then \( E = \frac{m c^2}{2} + \frac{k}{r} + \frac{\tau^2}{2m} \) = \( E_f \).

From Hydrogen Orbit-motion, \( r = \sqrt{\frac{3}{k f^2}} \), or \( k f^2 \), \( r^2 = 1 \) and Constant-Unit-Energy \( k = \frac{1}{r^2 \cdot r^3} \) which Energy \( k \) is the, Quantum of Energy, in the first Planck-length-cave. For Black-Holes, the Total-Energy \( L = \vec{B} \cdot \vec{w} = \frac{J}{2} \) \( = \frac{\pi r^2}{2} [2\pi f]^2 = 2\pi^3 r^4 f^2 = r m v = r m \cdot \tau r \) and mass \( m = \frac{2\pi^2 r^4 f^4}{r^2 2\pi f} = \frac{\pi^2 r^2}{2} [\tau v^2] = \frac{\pi r^2}{2} \), while Angular-Momentum \( \vec{B} = r m v = r \left[ \frac{\tau v^2}{2} \right] \) \( = \frac{\pi r^2}{2} \). \( \vec{v} = \frac{\pi r^2}{2} [n \pi c]^2 = \frac{\pi^2 r^3}{2} \cdot c^2 \), or Black-Hole-Energy → \( \vec{B} = 2\pi r^3 f^2 = (\pi r)^3 , w^2 \) ← i.e. Velocity in Black-Holes is Related to Cave, \( r^3 \), and Energy \( w^3 \) times of light velocity.

C... THE ENERGY CAVES, AND E - GEOMETRY:

**Figure – 1 – :** The Periodic motion in Caves follows Material-Geometry rules.
In (1). Is shown the Geometrical Expose of Dynamic-Space-Energy relation \[ g \cdot r^3 f^2 p = 1 \]
In (2). Is shown the Mechanical Impress of the Orbit-Space-Energy relation \[ g \cdot r^3 f^2 p = 1 \]
In (3). Is shown the Extreme Design of the Dynamic-Space-Energy relation \[ g \cdot r^3 f^2 p = 1 \]

To proof:
The Right-angled-Triangle ABC at A = 90°, lies on [O, OC = OA] circle and CE is the
tangent at C. Since angle BAC = 90° of triangle CAE, then angle < CAE = 90°.
Since BA ⊥ AC and AT ⊥ BC then, the Power of Point B on ACT triangle is BA² = BT.BC
Since BC ⊥ EC then, the Power of Point B on ACE triangle is BC² = BA.BE ….(2)
Squaring the first relation and substituting (2) then [BA²] = BT².( BC² = BA.BE) and
BA⁴ = BT², BA.BE , or → BA³ = BT² . BE or → \[ \frac{1}{BE} \cdot BA^3 \cdot \frac{1}{BT} = 1 \] o.e.δ …..(3)

Remarks:
1. Physics follow the Geometry-Rules in all levels, either in microcosm or in macrocosm.
2. Constants in Physics, are defined as Geometry-Linear-monomads, or the opposite.
3. The Physical dimensions are defined in two Perpendicular-Lines as the Surfaces are.
4. Linear-Vibrations \[ \tilde{x} + w^2 x = 0 \] of Two-masses In Orbit-Caves, Occur on the Line Vectors or on Straight-lines in the x, y Plane as Centripetal forces.
5. Linear-Vibrations \[ \tilde{x} + w^2 x = 0 \] of Three-masses, Occur on Two-Line-Vectors Perpendicular each other, vibrating on Straight-line, \( \tilde{y} + w^2 y = 0 \), of x ⊥ y Plane and follow the Lissajous Shapes, [83], where for, a.. Difference of Phase \( d_\varphi = 90° \) emission is → The Eight-Shapes 80.
b.. Difference of Phase \( d_\varphi = 0° \) emission is → The Ellipse-Shapes ∞.
c.. Difference of Phase \( d_\varphi = 45° \) emission is → The Double-Saddle-Shapes 8, δ0.
6. For Planck length [73] P-49, was shown that the Rotated Energy case, when \( s = 0 \) and \( \cos \varphi = 0 \), exists for angle \( \varphi = \pi/2 \) and Quaternion \( (s + \tilde{v} \quad \nabla i) \frac{1}{w} = e^{-i(\pi/2 + 2\kappa m)}w \)…(1)
the dimension power → \( w = b \quad and\quad for \quad k = 1 \) then (1) becomes \( [84]-P.74 \)
\[ e^{-i(\pi/2 + 2\kappa m)}w = e^{-i(\pi/2 + 2\kappa m)}b = e^{-i(\pi/2 + 5\kappa m)} \] ……..(2)
Equation (2) fits, as minimum cave, in the Planck length and is \( L_p = e^{-i(\pi/2 + 5\kappa m)} \) …..(3)
Equation (3) is the smallest Energy-Unit of Space, and this because of \( s = 0 \) and \( k = 1 \).
It was shown [31] that Space and Energy is quantized and measured on the two Constant and Natural numbers \( e, \pi \), where for base the natural logarithm, e, and exponent the decimal base, \( b = 10 \). From → \( z^{1/w} = (s + \tilde{v} \quad \nabla i) \frac{1}{w} = |z|^{-w}.[\cos(\varphi + k\pi)/w + i.\sin(\varphi + k\pi)/w] \)
\( = |z|^{-w}. e^{-i(\varphi + k\pi)/w} \) for \( \cos(\varphi + k\pi)/w = 0 \) then exists only the Imaginary part of monad
\( \tilde{v} \quad \nabla i \neq 0 \), where \( \varphi = \pi/2 \) and then, \( z^{1/w} = |z|^{-w}. e^{i(\varphi + k\pi)/w} = e^{-i(\pi/2 + k\pi)}10 \) which is
the Diffraction mechanism for all Space Levels of quantization which are the Energy Particles only i.e. The Energy particles in Stationary caves are \( z^{1/w} = |z|^{-w} \). \( Lv = E-Monad \).
Extending quantization of Energy according to exponential formula → \( L \quad v = e^{-i(\pi/2)10} \) then \( L \quad v \) on the decimal base \( b = 10 \) and for \( k = ±0 \rightarrow ± \infty \), are the Energy caves as,
For base \( e = 2,71828 \) and base \( b = 10 \) then \( e^x = (13,8155) = 1.10^6 \) m
For base \( e = 2,71828 \) and \( k = 0 \) \( Lv = e^x i(\pm \pi/2)10 \) then \( e^x = (15,7079) = 1,78118 .10^7 \) m
For base \( e = 2,71828 \) and base \( b = 10 \) then \( e^x = (16,1181) = 1 .10^7 \) or \( r = 1,07.10^7 \) m.

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Placing $r$, in the Dynamic-Space-Energy relation when $g =1$ then $r^3 f^2 p = 1$ and $f^2 p = \frac{1}{r^3}$

$= 8.0647139.10^{20}$ m and occurs the, minimum frequency $f_m = 2.839844.10^{10}$ H . . . (4)

For Electron radius $r_e = 5.82.10^{-16}$ m, Weight of Electron $Q = m_e g = 9.11.10^{-31}.9.10^8$

$= 8.93.10^{-30}$ Kg , the Moment of Inertia-Disk $J_e = \frac{3 - 10}{2} = \pi/2[5,8.10^{-16}]^4 = 1,777591.10^{-61}$ m$^4$, Angular velocity $w_e = \frac{v}{r_e} = \frac{c}{1836} = \frac{3.10^8}{1836} = 1.633.10^5$ m/s because of masses analogy and Electron-Nutation-frequency $f_N = \frac{s Q}{2\pi J_3 w} = \frac{5.82.10^{-16}.8.93.10^{-30}}{2\pi .1777591.10^{-61}.1.633.10^5}$

$= 2.8398447.10^{10}$ s$^{-1}$ exists in all Atoms. due to the Hydrogen first cave, is the Resonance-frequency between Atoms and Molecules in Cosmos.

i.e. THE SPACE $\{ \ r_{\min} = 1.07.10^{-7} \}$ - ENERGY $\{ f_m = 2.839844.10^{10} \}$ IN QUANTIZED-CAVE $\{ g . r^3 . f^2 R = 1 \}$ OF SPACES $\{ [s + v \ \nu i]^{1/w} = e^{-i(\frac{\pi}{2} + 2k\pi)}w}$

$= e^{-i(\frac{3\pi}{2})}10 \}$ , CONSISTS The min. QUANTUM-ENERGY $\rightarrow E = 1,1745$ eV.

7... For Energy-Cave equation $\rightarrow e^{-i(\frac{5\pi}{2})}$ 10 Formatters min-cave $\rightarrow r = 1.07.10^{-7}$ m which in turn by the Unit-Energy Orbit-Surface-U-Planck-relation, $g = 1 \approx g$, and from ,

8... Unit-Energy-Mould $g . r^3 . f^2 R = 1$ or $f^2 R = \frac{1}{r^2}$ creates the minimum frequencies , Energy,

$f_R = 2.8398447.10^{10}$ H , between , $1.330265.10^{10}$ H and $4.1701097.10^{10}$ H in caves and the in Electron-Cave which is The Nutation-Unit-Frequency and becomes the minimum Quantum-Frequency again , in above $r$ , cave and which is following ,

a... Frequency $f_N = f_R = \frac{g(s_{m})}{2\pi J_3 w}$ which passes through atoms structure and as Energy-Spring in Magnetic-field , Strengthens and manifested , as The Images in MRI

This Property of Electron-Nutation is very Probably interested in Medicine , MRI and in many other Media as Mobiles and Others , because of $\rightarrow \langle r_{\min} \cup \cup [f_m] \rightarrow [f_N] \leftarrow$

It is proved in [86] that this Energy-Spring of Electron-Nutation creates the Energy-Bonds in Atoms so that this bond to Originate-Molecules .

b... The Article , New Electromagnetic-Structure of Atom [90] contains ,

1. The Unit-Quantization of Planet-Focus line $r$ , sweeping $r . mv = k= $ Constant-Area
2. The Unit-Cave-Energy Quantization as Work is $\rightarrow W = 4\pi^2 r^4 . f^2 p = 1$

3. The Resonance Unit-Cave-Frequency $f = \frac{1}{\sqrt{4\pi^2 m . r^3}}$ of Masses $\frac{1}{M_T} = \frac{1}{m_p} + \frac{1}{m_n} + \frac{1}{m_e}$

4. Charges $\frac{1}{Q_T} = \frac{1}{4\pi} + \frac{1}{q_e}$ from Lorentz force, F=qE+qvB ,in Magnetic-Field $\overrightarrow{B_F} = \frac{2\pi M_T}{q_T}\hat{f}$

5. The Resonance Energy $E = \frac{1}{2} \left[ \frac{m^2 r}{c^2} + \frac{S^2}{2m} \right]$ or $E = \frac{\pi}{r^2} \left[ g^2 r + 2.5^2 f^2 \right]$ in cave $a = \sqrt{1/g . f^2}$

c... Equations (f-8) which is extreme case , Space-Energy ,for the velocity in Hydrogen cave or for Geometry and Mechanical interpretation either Separating each other or and Both. Energy-Constant $k$ (f-7) regulates motions in caves as the constants in integrations .

d... Hydrogen-Circular-radius $a = \sqrt[3]{\frac{1}{g_f}} = 2.1145016.10^{-11}$ m , from $f_1 = E/h = 13.6$ eV/h

and for $e = 0$ then $v^2 = \frac{1}{r} \left[ 4\pi^2 . k \right]. \frac{1}{r}$, and constant $k = \frac{r \cdot v^2}{4\pi} = \frac{a \cdot v^2}{4\pi}$. The Constant $k$ of

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Electron-Nutation is measured as \( k = \frac{2,1145016.10^{-11}(2,998.10^9)^2}{4\pi^2} = 4,81406.10^4 \) m\(^3\)/s\(^2\).

c. For any Material-Point occupying only Spin \( \equiv L \), then \( k = \frac{1}{2} \frac{[1+2\pi^2m(1+e)]}{r} = 0 \) or 

1+2\pi^2m(1+e) = 0 
and for Electron \( k = -\frac{1}{2m\pi^2(1+e)} = -\frac{1}{(1+e)} \) [6,9999, 10^29] N 

Rotating-Energy due to Electron-Spin is \( E = \frac{1}{2} \frac{\text{AB}^2}{r} = \frac{(1.51.10^{66})^2}{2.1.6.10^{42}(2.4.10^{15})^2} = 2,604.10^{43} \) J

equal to the Energy of an Electromagnetic gamma-ray-burst \( \rightarrow \) i.e. energy-constant \( k \), is the Regulator of Energy as equation, \( k = \frac{r.v^2}{4\pi^2} = \frac{(2.4.10^{15})9.10^{16}}{4,\pi^2} = 5,47.10^{30} \) N.

1c. The Golden Ratio Pattern \( \Phi \).

![Diagram](image_url)

**Figure – 2 - :** The Physical explanation of The Golden-Ratio \( \Phi \) in Universe:

In figure - 3, AB Sector is divided by point C such that \( \frac{AB}{AC} = \frac{AC}{CB} \) such that \( AB = \frac{AB}{2} \) \([\sqrt{5}+1] \) ....(1)

Proof:

According to the definition of Mean ratio exists \( AB / AC = AC / CB \), or \( AC^2 = AB \cdot CB \)

\( AB \cdot [AB - AC] = AC^2 = AB \cdot (AB) + AB^2 = AC^2 + AC \cdot (AB) - AB^2 = 0 \) ....(2)

Solving the second degree equation (2)

then \( AC = \frac{AB}{2} \) \([\sqrt{5}+1] \), i.e. Point C on AB sector, is such that issues (1).

The Physical meaning becomes from Mechanics where, when a force \( P \), acting on a surface \( S \), of a differential volume \( ds \), then Principal stresses \( \sigma_1, \sigma_2 \), and Shear stresses \( \tau_{12} \) are as equation \( \sigma = \sqrt{(\sigma_1 - \sigma_2)^2 + 4 \tau_{12}^2} \), and

\( \sigma_1,2 = (\sigma_1 + \sigma_2) / 2 \pm (\frac{1}{2}) \sqrt{(\sigma_1 - \sigma_2)^2 + 4 \tau_{yz}^2} \), where \( \sigma_1,2 \) = principal 

When the surface becomes a Point [This is the Extreme case where surface is interchanged as line or line-segment, it is the same as the infinite small, ds, in Calculus], then \( \sigma_2 = 0 \)

and \( \tau_{12} \) is very small i.e.

It is a type of vanishing Shear due to layers laterally shifted. Since force \( P \) is a vector then as in cross-product to a right-handled coordinate system, where exists \( \sigma_2 = 0 \) and \( \tau_{12} = \sigma_1 \), then (equation (3)) becomes.

\( \rightarrow \sigma_1,2 = \sigma_1 / 2 \pm (\frac{1}{2}) \sqrt{\sigma_1^2 + 4 \sigma_1^2} = \frac{\sigma_1}{2} \cdot [1 \pm (\sqrt{5})] = \frac{\sigma}{2} \cdot [1 \pm (\sqrt{5})] \) ....(4)

Equation (4) denotes the way that Stresses \( \sigma_1,2 \) are shaped on any Volume according to the Principal Stress \( \sigma \), and which is the Golden-ratio \( \Phi = \frac{\sigma}{2} \cdot [1 \pm (\sqrt{5})] \) of Stress \( \sigma \).
Since also Stress $\sigma$ eternally exists in Material point and is of the Golden-ratio-pattern $\Phi$, therefore microcosm and sequence all macrocosm follows, the Stress $\sigma$, Property Vector, of the Growing-Golden-ratio-pattern $\Phi$ as this is stated in,

1. Stress with Golden ratio Property,
2. Centripetal acceleration due to Stress,
3. Gravity $= \sigma = \text{Centrifugal acceleration}$,
4. Gravitation constant $G \, \text{Stressing}$, etc.

All above related vectors, of frequency $f_n$, occupying the Growing-Golden-ratio pattern $\Phi$, give the analogous strength to enter caves, and incidentally in saturation Systems to follow the Split-Property as this happened to Organic - Chemistry.

The $\Phi$ Properties:

To show that $\Phi = 1 + \frac{1}{\Phi} = 1$, 6180339887 : Proof, it is holding $\rightarrow 1 + \frac{1}{\Phi} = 1 + \frac{1}{1 + \sqrt{5}/2} = 1 + \frac{2}{\sqrt{5}+1} = \frac{2(\sqrt{5}-1)}{\sqrt{5}+1} \frac{\sqrt{5}-1}{2} \approx \Phi$, therefore, $\Phi = 1 + \frac{1}{\Phi} \ldots(5)$

Equation (5) is a very Interesting Property of the Golden - Ratio because is that $\Phi$ can be Defined in terms of itself, i.e. of unit 1 equal to a new $\Phi$, which defines the Space, and of $\frac{1}{\Phi}$ defining the Opposite which is the Anti-Space.

and as continuous fraction is, $\Phi = 1 + \left[ \frac{1}{1 + \frac{1}{1 + \frac{1}{1 + \ldots}}} \right]$ (6)

Because number $\Phi$, multiplied with its Reciprocal number $\frac{1}{\Phi}$, is process of Addition, and equal to unit 1, so $\rightarrow$ Space * Anti-Space $\equiv$ Monad $\leftarrow$ or $\Phi \times \frac{1}{\Phi} \equiv 1$ because, $\rightarrow \Phi \times \frac{1}{\Phi} = [1 + \frac{1}{\Phi}] \frac{1}{\Phi} = 1$ or $\rightarrow \frac{1}{\Phi} + 1 = \Phi \rightarrow \Phi + 1 = \Phi^2$ or $\Phi^2 = \Phi + 1 \ldots(7)$

Equation (7) is written $\Phi^2 - \Phi - 1 = 0$ and the roots of the second degree equation is $x = + \frac{1}{2} \pm \frac{\sqrt{5}+1}{2} \approx 1.61803 \ldots$ i.e. Golden-Ratio Property is continuously increasing by its self, a Self-Growing Property of frequency $f_n$ of Material-point.

Equation (7) is also a very Special property of the Golden ratio because, according to Euclid, $\rightarrow$ A straight line $AB$ is said to have been cut in Extreme and Mean ratio when as the whole line is to the greater segment AB : AC, so is the greater to the lesser AC / CB, and according to Markos, Since frequency in Material-point becomes from Equilibrium of $\rightarrow$ The Two-Opposite-Rotational-Energies $\left[ \pm \right]$ $\rightarrow$ as relation $\overline{B\,\overline{w}} = \frac{L}{2} \left[ \frac{3}{2} \left( \frac{\pi \, r^2}{2} \right) + \frac{\pi \, r^2}{2} \right] \Rightarrow \frac{L}{2} \left[ \frac{3}{2} \pi \, r^2 \right] = \frac{2L}{2\pi r} \Rightarrow \frac{2L}{2\pi r} \Rightarrow \frac{L}{\pi r} \left[ \frac{1}{2} \right] \Rightarrow \frac{4L}{(1+\sqrt{5})\pi} \Rightarrow \text{or}$

$\overline{B} = \frac{4L}{(1+\sqrt{5})\pi} \Rightarrow \frac{2L}{2\pi r} \Rightarrow \frac{L}{\pi r} \Rightarrow \text{SPIN}$, where $L = h f = \text{Constant}$

and Frequency related to $\Phi$ is $\rightarrow f_n = \frac{2}{\pi \, r^2} \Rightarrow \overline{B} \equiv \left[ \frac{1+\sqrt{5}}{2} \right] \left( \frac{\sigma}{2\pi r} \right) \Rightarrow \left[ \frac{\Phi \, \sigma}{2\pi r} \right] \Rightarrow \ldots(7a) \rightarrow$

Occupies the Property of the Golden-Ratio-Pattern $\Phi$, and equation (7-7a) defines that Material Point of frequency $f_n$ when collide with another Material Point, or with

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another Particle or particles then Produces another monad as → 1 ≡ New Quaternion and the first continuous to be of the same Identity, frequency $f_n$, as before and from Euler’s, rigid body dynamics work $W = 2L = B \cdot \vec{w} = J \cdot w^2 \equiv h. f_n$ → i.e.

The Frequency of Photon, embodied with the → Growing-Golden-ratio-pattern Φ Uses the Vibrating Physical Structures, the Granular Material-Instruments, to Kick Start all of them and everything in this World. The How is in [86]

2c... The Forces, Stresses and Spin Orientation:

Figure -3-: The Energy-Space, Stress-Strain in wavelength $\lambda = 2\pi r$, of a moving Photon:

1. For area $A = 0$, the acting Force $F$ which is an Energy-Space-cave, is manifested into the Transverse-Principal stresses, $\sigma$, $\tau$, and then as an Moving-Storage (1)- (2) is transported as Velocity-Vector $\vec{v}$. The force $F = \sigma.A \rightarrow \vec{p}$ vector = $M.\vec{v} = (m \lambda).\vec{v} = [m \cdot c \cdot f]$. $\vec{v} = [m \cdot f] \cdot c.\vec{v}$, i.e. Force $F$ becomes a Velocity-Vector $\vec{v}$, or a Force as Stress $\sigma$ enters in Space $\Phi$ as $[\sigma \Phi]$ and becomes Frequency $\vec{f} = \frac{\sigma.\Phi.\vec{r}}{2\pi r_n}$ and exists Force $F = \sigma \cdot A = \frac{2\pi r f \cdot A}{m \cdot r_n} = \vec{v} \cdot \frac{A}{\Phi}$, which Force $F$ becomes a moving Storage.

2. For area $A > 0$, Force $F$ which is an Energy-Space-cave, resolves as Electromagnetic Radiation in the Principal stresses $\pm \sigma_1$, $\pm \sigma_2$, $\pm \sigma_3$, which is the Passage through which Forces travel in moving Solids. From the theory of Elasticity the equilibrium of a surface -Configuration in an Isotropic material obey equilibrium equation $\mu.\nabla^2 u + (\lambda + \mu) \cdot \nabla.\nabla u = 0$

3. For area $A < 0$, because Force $F$ is an Energy-Space-cave which at first passes from the Zero area $A = 0$ and becomes velocity-vector $\vec{v}$, this velocity-vector $\vec{v}$ is entering any trough, Potential, and transformed to an Energy-Rim, as these are the Orbits of Electrons. Because Photon is one of the moving-energy-stores, when it enters a cave $L_s < L_P$, then the cave becomes an Discrete Energy-Packet which is the Rim $L_v$.

4. For area $0 < A < 0$, The Extreme case, where surface is interchanged as line or as line-segment, and is the same as the infinite small, $ds$ in Calculus, where stresses $\sigma_2 = 0$ and $\tau_{12}$ are very small, it is the equation of stresses $\sigma_1, 2$, and from Cauchy $\sigma_1 / 2 = \pm \left( \frac{1}{2} \right) \sqrt{\sigma_1^2 + 4. \sigma_2^2} = \sigma_1 \cdot [1 \pm (\sqrt{5})] / 2$, which is the Golden-ratio-Pattern
of the Material-Point as a Type of a vanishing-Shear due to layers laterally shifted.[26]

This minimum quantized energy \( \sigma \), was proved that is going out the Material point as acceleration and creates Stationary-gravity \( g \) as \( f_n \), acting on Spin as \( S_{PA} \cdot r^4 \).

The Proof →

**Centripetal Force** \( F_c = m \cdot v^2/r = 1. (wv)^2/r = w^2. \quad r = \pm \sigma = (2\pi f_1)^2. \quad r = \sigma.1. \quad [1 \pm (\sqrt{5})]/2 \) and \( w^2 = \sigma^n = \left( \frac{(1+\sqrt{5})\sigma}{4\pi r} \right)^2. \quad \) From Kinetic energy \( E = \frac{mv^2}{2} = \frac{1. w^2 r^2}{2} = h f \), then \( w^2 = \frac{2E}{r^2} \) and \( E = \frac{1}{2} \left( \frac{(1+\sqrt{5})\sigma}{4\pi r} \right)^2. \quad \)

\( f_n = \left( \frac{(1+\sqrt{5})\sigma}{4\pi r} \right)^2. \quad \) Then force \( f_n \) orients Spin \( S \) to \( B \) as \( \rightarrow g = f_n \times B = f_n |B| \sin{\theta} = \frac{[(1+\sqrt{5})\sigma]}{4\pi r} \Phi \sigma \cdot \frac{1}{2} \left( \frac{r^2}{2} \right) \). \( \) Equation (g) which is Gravity constant \( g \), is the permeable Path for inner stress \( \sigma \), to pass the Material’s-point a surface \( 4\pi r^3/3 \) and to expenditure its Energy. The same exists also to the Electromagnetic force which is associated with a fundamental Property of matter which is the Electric-Charge and which is a clue to the ubiquity of Electromagnetism. From equation of Gravitation \( G = k_{E} \Phi = g. \left[ k_{R} g_{R} \right] \) seems that the two constants are related i.e. *act each other through Local-coefficients or through Field-lines*, called the Medium or Permissible Path which is as \( \sigma = \frac{F}{A} = \frac{2\pi r f}{\Phi} = \frac{w r}{\Phi} \), velocity vector in a Unit-Space \( \Phi \).

It was shown that the first Path is Gravity \( g \) and Original Field-lines of Force \( G \), are distorted by these Charges, Local-coefficients, the Layers following Newton’s laws. The Original Field-lines terminate at the surface on one side of the Medium, and new field lines originate from the other side of it. It was shown that the Momentum vector \( \vec{B} \), is equal to spin \( S \), because it is following the Stationary - Wave - Nodes - Principle in the Material-Point, creates the minimum quantized Energy which is conserved in lobes. This Property is extended also to the Number of lobes as well as to, \( \pi \), number as velocity \( \{ v = n.\pi.c \} \) which is the minimum Number relating Lines and Surfaces.

Analogous happens in equation (c) when \( v = c \), and \( r = c \).

From Inner-velocity equation \( v = w.r = (2\pi / T).r = 2\pi f_1 \cdot r \), of fundamental frequency \( f_1 \), of wavelength \( \lambda = c.T = c / f_1 \), and cave \( r = n.[\lambda/2] \), then \( r = n.(c / 2f_1) \) and \( v = 2\pi f_1 \cdot n.[c / 2f_1] = n.\pi.c \) or \( v = n.\pi.c \) .......(π)

Equation (π) shows that velocities in lobes are, \( n.\pi \) times that of light, following, \( \pi \), number in circle, i.e. in Material-points exist velocities multi-times that of light and the minimum Surface-constant, Unit \( \pi \), or the Growth of the velocity-vectors occurs in lobes by following the logarithm laws of Energy-constant \( c \) which is acting on Space constant \( \pi \). From velocity, \( v = n.\pi.c \), is seen that light-velocity is the Quantum of Unit-velocity in Planck’s length. The Why velocity \( c \) and \( \pi \), is such in [42-51-63] and now later.

**Kepler’s Laws** → Explain How the Planets move around the Sun But NOT the WHY.

**Newton’s Laws** → Explain the WHY by filling this Gap by a Force \( F = G.m_1.m_2 / r^2 \), acting instantly between the bodies that are moving around each other But NOT their Nature and NOT the HOW Force is Acting.

**Markos-Spaces** → Explain the WHY by filling the Gap with a Double-Ocean of the Pointy-Spinning- Material-Points, becoming from the Stationary - Material-Points, Photons or Electrons, and from the moving-Energy - Storages, the Photons, which Orientate and Re-orientate the Stationary-Spins, and explain the HOW and the WHY all motions follow the ubiquity of the Electromagnetism, starting from the Primary-Material-Points, Photons, which through the Golden-Ratio-frequency-Growth effect and conserve the Whole of the Natural-World from microcosm to macrocosm.

**D. THE PHOTONS**

Photon Particle, Photon Wave OR The Duality Photon ???
**THE n = 4 LOBES MOVING STORE**

- **Wavelength** $\lambda_n = 2r / n$
- **Fundamental Frequency** $f_1 = [\sigma (1+5) \cdot / (8\pi r^2)]$
- **The Velocity $V$ of Energy Cave Store $r = EP$**
- **Electric Force - Vector** $E$
- **The Vertical Electric Field**
- **The Horizontal Magnetic Field**
- **The Vertical Magnetic Field**
- **Cave EP = $r$ is the Energy 4 - Store - lobe Standing Wave**
- **P = Magnetic Force - Vector**
- **Total Work** $W_n = n \cdot \frac{f_1}{1}$

**Figure - 4 -**: The Propagation of Photon-Electromagnetic-Field-Storage EP :

In figure $r = \lambda / 2 = EP$ is the Energy-Storage-monad $[S \equiv EM-R \equiv f_1 = n, f_2, f_3, f_4, f_n = w^2]$

Propagating with $\nu = \lambda_n f_n = c \cdot \left\{ \frac{\sigma}{2\pi} + \frac{\sigma \Phi}{2\pi} \right\} = \frac{\sigma \cdot c}{2\pi} + \frac{\sigma \Phi}{2\pi} = \left\{ c \cdot \left[ \frac{f_n}{c} \right] + c \cdot f_n \right\}$, where for frequency $f_p = \frac{\sigma}{2\pi} + \frac{\sigma \Phi}{2\pi} = \frac{2nB}{n\pi r^4} + \frac{\sigma \Phi}{2\pi}$, as Particle, where velocity $\nu = w.r$, follows the Breakage-Principle which is Quaternian $\bar{\nu} = \left[ s + \nu \right] V$ or $\rightarrow s^2 - |s|^2 + |s|^2 V$, $V \rightarrow \equiv$ $[\epsilon E^2 + \mu B^2] \equiv$ The Energy-monad, EP, and as a Wave as, $f_p = \frac{\sigma \cdot c}{2\pi} + \frac{\sigma \Phi}{2\pi}$

- **Matter (++) $\equiv$ Magnetic-field $\rightarrow [\mu B^2] \equiv$ The Storage-Basket**
- **Antimatter (-) $\equiv$ Electric-field $\rightarrow [\epsilon E^2] \equiv$ The Moving-Basket**

Energy $(+\leftrightarrow-) \equiv$ Motion in n lobes $\rightarrow [\partial E / \partial t, \partial H / \partial t]$ i.e.

The Stationary-Cave-lobes, consist as the Particle-Photon as the Inside motion, in the cave $r = n \left( \lambda / 2 \right)$ Energy-Storage, and $[E^2 + H^2] = 2(2r).c.\sin2(\Phi \equiv \frac{\Phi}{\Phi})$, the Wave-Photon. Energy-Storage-monads are consisted of the above Three-constituents all-together,

Or each-one of them. The Work ratio is $\rightarrow W_n / W_1 = f_n / f_1 = n (n+1).[v_n / v_1] = n(n+1) \frac{\lambda_n f_n}{\lambda_1 f_1} = n(n+1) \frac{\lambda_n f_1}{\lambda_1 f_1} = n^2(n+1) \frac{\lambda_n}{2r} = n(n+1)$

and for $\lambda_n = 2r$, then $v_n = v_1$, and then $n \cdot \lambda_n = 2r$ or

The Work, $W$, Produced from the Wave-Energy-Pattern, with wavelengths $\lambda_n$, and Created from all Points of the Periodic Oscillation of any Cave, $r$, is Stored into the, $n$, Integer and Energy - Lobes of this cave $r$, where $E^2 + H^2 = B^2$. Photon $\rightarrow \{ c \cdot \left[ \frac{f_n}{c} \right] + c \cdot f_n \}$

From Mechanics, the Only - Possible motions are, the Periodic-Excitation, and the Revolving-Motion therefore all Moving-Energy-Store travel as a Wave and Not as a Particle. The $n$, Energy-Tanks, the N Antinodes in its moving Store $2\lambda = r = h / p \equiv [f_1, f_2, f_3 = w^2 \equiv n \text{ lobes}]$ follows the Stationary-Wave-Nodes-Principle, i.e.
The Glue-Bond-Stress Rotation of opposites on Small - circles creates , n . Integer number of lobes , which is the Wave-Nodes-Principle of the moving-energy-stores , one of which is the Photon .

The {n} Energy - Storages of The Moving – Monads . Figure - 4-

In Electromagnetic field , EM-field , Magnetic-field is the Store in which Energy ≡ motion is Stored , and Electric-field is the Force , The Energy , which Pushes the

[ Energy-Store Basket ≡ The Magnetic-field ] , executing the Helicoid motion .

In Store , r , Wavelength $\lambda_n = \frac{2r}{n}$ , Fundamental-frequency $f_1 = \left(\frac{\sigma(1+\sqrt{5})}{4\pi r}\right)$ , and Work = h.f ,

The Energy-Storage length E-P = $\sqrt{2}/r$ , is composed of 4 Lobes with wavelength $\lambda_4 = \frac{2r}{4}$ , $f_4 = \frac{4\nu}{2r} = 4f_o$ , and $W_4 = \frac{h}{2r}v_4$ , and for ∠ Loop-Total-Work , $W = [\frac{4\pi r^2 f_1}{3}]n(n+1)$

or $W = \frac{80.\pi r^2 f_1}{3}$ , and from Photon → { $\vec{c} \cdot f_n + \vec{c} \cdot f_n$ } ← $v_4 = \lambda_4.f_4 = 4\lambda_4.f_o$ , therefore for ,

$n = 1 → f_1 = 1.\left(\frac{\sigma(1+\sqrt{5})}{4\pi r}\right)$ , Wavelength $\lambda_1 = \frac{2r}{1}$ , Energy $W_1 = \frac{4\pi r^2}{3}f_1 = 1.\left(\frac{(1+\sqrt{5})\sigma r}{3}\right)$

$n = 2 → f_2 = 2.\left(\frac{\sigma(1+\sqrt{5})}{4\pi r}\right)$ , Wavelength $\lambda_2 = \frac{2r}{2}$ , Energy $W_2 = \frac{4\pi r^2}{3}f_2 = 2.\left(\frac{(1+\sqrt{5})\sigma r}{3}\right)$

$n = 3 → f_3 = 3.\left(\frac{\sigma(1+\sqrt{5})}{4\pi r}\right)$ , Wavelength $\lambda_3 = \frac{2r}{3}$ , Energy $W_3 = \frac{4\pi r^2}{3}f_3 = 3.\left(\frac{(1+\sqrt{5})\sigma r}{3}\right)$

$n = 4 → f_4 = 4.\left(\frac{\sigma(1+\sqrt{5})}{4\pi r}\right)$ , Wavelength $\lambda_4 = \frac{2r}{4}$ , Energy $W_4 = \frac{4\pi r^2}{3}f_4 = 4.\left(\frac{(1+\sqrt{5})\sigma r}{3}\right)$

i.e. in store , r , can exist n , frequencies as $f_n = n.f_o$ , n , times the fundamental frequency .

Electromagnetic waves are created by the vibration of an Electric-charge . In Material – Point ,

The temporal rotation of the + constituent around the - constituent creates the , n Energy-lobes in a Tank $r = n\frac{\lambda}{2}$ or $\lambda = \frac{2r}{n}$ , since the velocity of the wave is $\vec{v} = \frac{\lambda}{T} = \lambda \times f$ . The frequency is $f = \frac{n.\nu}{2\pi r}$ where n is a positive integer number . Because in lobes the inner particles are the [+ ] , [- ] constituents of , Space and of Anti-space , the maximum amplitude of each constituent is related with its Position and each Amplitude oscillates periodically as the wave equation ,

$x = v_o . \sin wt = A . \sin \left[\sqrt{(A/Am)} . (t + \pi/2)\right]$ ........(1) where

a. Velocity → $|\vec{v}| = w = \frac{2\pi}{T} . r = 2\pi f$ , and $f_n = \frac{n.\nu}{2\pi r} = \frac{n.\sigma}{4\pi r} . \left[1 + \sqrt{5}\right] = \frac{n.\sigma}{2\pi r} ,$

b. Angular velocity → $|\vec{w}| = \frac{\sigma}{2r} . \left[1 + \sqrt{5}\right] = \frac{\sigma.\Phi}{r}$ , and Fundamental frequency $f = \left(\frac{1+\sqrt{5}}{4\pi r}\right)$

In case , r , where , Wave propagates , as in a Magnetic-device the arced pattern , by travelling from North to the South Pole , and thus creating the Inner - Electromagnetic-Displacement, the Current which is $\partial E/ \partial t , \partial H/ \partial t \leftarrow$ and when reduced to one line as , $E = H c \rightarrow$

$E \rightarrow \partial E/ \partial t \rightarrow H \rightarrow / \partial t \rightarrow H$ .

This vibration of opposites creates a Wave which has both an Electric , E , and an Magnetic component , H , perpendicular each other and is as

$[ E^2 + H^2 ] = 2.(2r).c . \sin 2\Phi$ .... (2) on-where exists the Skin-effect . [68-70]

This happens because of the difference in density in Stress-common-curve , $\rho = \sigma$ instead – of density $\rho = 0$ as happens at the center of the circle .

This Property in Material-point Launches , The Inner-Electromagnetic-Wave , Out of

The-Particle ≡ $[ E^2 + H^2 ] = 2.(2r).c . \sin 2\phi \equiv \frac{\vec{B}}{\phi}$ , of wavelength $\lambda$ , Outward $\lambda$ , as The Outer Electromagnetic-Wave → {The-Wave ≡ $\left[\epsilon E^2 + \mu B^2\right] = 2.\lambda.c . \sin 2\phi$ } ← and allows all the Energy-Wave-Storages to Propagate any Distance in Vacuum without any dissipation .

This Inner-motion ≡ Work W , from the Wave-Energy-Pattern with Wavelengths $\lambda_n$ , is created from all ± Points of the Periodic Oscillation in any cave r , and is stored in the n lobes as motion . This motion is conserved and is transported through vacuum at the speed of light c .

Photon Particle , Photon Wave  OR The Duality Photon  ???
Since the Medium-Field- is the Material-Fragment → [± s²] = [MFMF] ≡ The Chaos, is the base for all motions so then it is, the Motion of Photons: All motions create Work which is conserved. Motion presupposes the velocity vector \( \vec{v} \), which when it is in motion collides with other velocity vectors, creating a Constant Work \( k \).

Motion may be Linear or Rotational for any displacement, \( r \), in any Store \( \equiv \) cave, so exists in Vectors the Quantum-Constant-Work → \( k = \vec{v} \times \vec{r} = v^2 r \), and becomes from relation \( n \lambda = 2r \), issuing \( 2r = n v / f \), and is \( v = \lambda f \) or \( \vec{v} = \vec{c} = \lambda f \).

Constant-Work \( k = v^2 r = (w r^3) r = \frac{2\pi}{1} r^3. r = \frac{4\pi^2 r^3}{\mathcal{T}^2} \), and \( \frac{r^3}{\mathcal{T}^2} = 4\pi^2 \), \( \mathcal{T} \) = Equivalent of \( 2r = n \lambda \), f or → 2r = n \lambda , and the Linear motion is continued by the Propagating Electromagnetic Wave, the Energy-Store-Convoyer.

The mechanism of Energy-transport through a Medium involves the Absorption and the Reemission of the wave-energy by the Atoms of the material. Since the Em Waves occupy a finite space \( \lambda = 2r \), as motion, then an Electromagnetic wave impinging upon the Atoms of a material, its energy is absorbed by the atoms of the material, and since Energy ≡ motion then occurs Resonance, and electrons within the atoms undergo vibrations. After a short period of vibrational-motion, the vibrating electrons, due to g effect on Spin S, create a New Electromagnetic wave with the same frequency as the first one and motion is conserved without delay through the medium. Nutation occurs due to the g \( \equiv \) above referred effect.

Because Energy is related to wavelength \( \lambda \), as equation \( E = h f = h (c/\lambda) \), then once the energy of EM-wave is reemitted then it travels through a small region of space, its Magnetic-field, between atoms and once it reaches the next atom the EM-wave is absorbed and transformed into electron vibrations and then reemitted as an → Electromagnetic-wave ≡ motion ←.

The actual speed of an Electromagnetic-wave through a material-medium, due to the Absorption and Reemission-process, is dependent upon the Optical-density of the medium, or when their atoms are closely packed upon their, Material-density, Impedance-Type. The Electric force \( F \), originated in Energy-field \( E \), by any two charges \( q_1 \), q2 and Spread in a Fixed distance, \( r \), occupies velocity \( \vec{v} = \vec{c} \) and is equal to distance \( \vec{r} \). The Above vector is \( \vec{v} = \vec{r} = \vec{c} \) and is used for the Pointy-caves, one of which is the Atom-Nucleus. [82]

The Eternal-rotation \( \Theta \) of the \( \Theta \) constituent around the \( \Theta \) constituent in M-Point and for Photon on a Cycloid, is the Creation Of, Period as \( w = \frac{2\pi}{\mathcal{T}} = \frac{g}{4r} = \frac{\sigma}{4r} \) and Frequency

\[
f_p = \sigma = \left[ \frac{\mathcal{A}}{2\pi} \right] = \left[ \frac{1 + \sqrt{5}}{4\pi r} \right] \sigma = \frac{\sigma \Phi}{4\pi r}, \] from Intrinsic Angular-Momentum-Vector relation \( \mathcal{B} = \frac{2L}{\pi^2} = \frac{\pi^2 r^4}{\mathcal{T}^2} \), SPIN - S, of Particles, From \( \vec{v} = \frac{G \Phi}{A} = \sigma \Phi = \vec{c} \) the Light-Velocity and

\[
f_p \sigma = \frac{1}{g} f_R^2 \text{ The-Hydrogen-cave, and from } E_R = \frac{1}{a^3} \left[ \frac{4\pi^2 c^2}{S^2} \right] \text{ the Atoms-Molecules.}
\]

i.e., Photon is an Energy-Spring-Store, \( r \), in a Stationary-wave of wavelength \( n \lambda = 2r \), and consisted of \( n \) stationary lobes filled in \( \lambda \) with inner motion the Electromagnetic-Displacement current, while Outward Propagates with light-speed as an Energy-Store \( [\vec{v} f_n] \rightarrow \lambda = 2r/n \), and \(+\) Electric-field as Space-motion and \(-\) Magnetic-field as Anti-Space-Store \( [\vec{v} f_n] \). [70]
Figure - 5 - : The Material-Geometry Mechanism-of-motion in Photons-Cave :

1d... The Duality Of Isochronous Photons

FROM MECHANICS The Eternal-Rotation of the Two Elements, \([\oplus \cup \ominus \ominus]\), Up or Down in the Material-Point circles, originates the Spins, \(\pm \frac{1}{2}, \pm 1, \mp \frac{1}{2}\), of all particles, fermions, or bosons, which combine from the above three-states just by adding their spins [36]. From Cauchy-Stress-Tensor under plane-stress-conditions, the Equation of stresses \(\sigma_{1,2}\), is \(\sigma_{1} / 2 = \pm (\frac{1}{2}) \sqrt{\sigma_{1}^{2} + 4. \sigma_{1}^{2}} = \sigma_{1} \cdot [1 \pm (\sqrt{5})] / 2 = \sigma \cdot \Phi\), which is the Golden-ratio-Pattern of the Material-Point as type of a vanishing-shear due to layers laterally shifted. This minimum quantized energy \(\sigma\), was proved that is going out the material point, because of skin effect, as acceleration and creates the stationary gravity \(g\) as \(f_{n}\), acting on spin as \(S_{PA} r^{4}\). The centripetal force is equal to stress \(\sigma\), so \(F_{c} = m v^{2} / r = 1. (w r)^{2} / r = w^{2} r = \pm \frac{1}{2} = (2 \pi f_{1})^{2} r = \sigma_{1} \cdot [1 \pm (\sqrt{5})] / 2 = \Phi \cdot \sigma\), and since \(m = \frac{\sigma}{w \cdot r} = \frac{\sigma}{w \cdot c} = \frac{\overline{B}}{r \cdot c}\) then \(\pm \sigma = \frac{\overline{B}}{r \cdot c}\) which is a relation between stress momentum and light-velocity \(c\).

It was shown in [70-P32] that in a cycloid, the area between the curve and the straight line is \(A = 3 \pi r^{2}\) and the arc length \(l = 8 r\). For the motion on cycloid, we consider a weight \(Q\), at a point \(A\), moving with free motion. Since reaction \(N\) is vertically acting, doesn’t give any tangential component therefore the only one becomes from \(Q\), which is equal to \(AT = g \cdot \sin \varphi\) and since \(\sin \varphi = \frac{s}{4 r}\) then \(AT = g \cdot \frac{s}{4 r}\). Since acceleration \(a = \frac{d^{2}s}{dt^{2}} = \frac{dv}{dt} = \frac{d(s)}{dt} = - g \cdot \frac{s}{4 r}\) then \(\frac{d^{2}s}{dt^{2}} = \frac{g \cdot \frac{s}{4 r}}{\frac{s}{4 r}}\) or \(\ddot{s} = - \omega^{2} \cdot s\) where \(\omega = \frac{2 \pi}{T} = \frac{\frac{g}{4 r}}{T}\) ...(a) which is a harmonic oscillatory motion showing that acceleration is proportional to displacement and is directed towards the origin with a period \(T = \frac{2 \pi}{w} = \frac{2 \pi}{2 \pi} = \frac{\sqrt{4 r}}{g} = 4 \pi \cdot \frac{r}{g} \sqrt{g} = 4 \pi \cdot \sqrt{\frac{r}{g}}\), or and \(w^{2} = \left[\frac{g}{4 r}\right]^{2}\), where \(w = 2 \pi f\).

Origination of frequency, or Period, happens from above property where \(\left[\frac{g}{4 r}\right] = 2 \pi f\).

In Material-Point the cycloidal-acceleration \(g_{cyc}\) is transformed as centrifugal acceleration \(g_{cyc} = \frac{(\omega)^{2}}{r} = \frac{g}{4 r}\), where \(r\) is the radius of the cycloidal-circle and \(R\) is the radius of curvature.
In Cycloid velocity-vector $\vec{v} = \vec{\sigma}$, the Glue-Bond-Stress between the Opposites $\oplus$, $\ominus$ so $\vec{v} = \vec{w}.r = 2\pi \vec{r} = \vec{\sigma} = \sigma \Phi$, Frequency $\vec{n} = \frac{\sigma}{2\pi r}$ and Total-Energy $2L = J.w^2 = 4\pi^2 f^2$

\[ w^2 = \frac{(\sigma\Phi)^2}{r^2} = [2\pi f]^2 \text{, or } \text{Frequency of Photon } f_p = \frac{\Phi}{2\pi r} = \frac{[1 + \sqrt{5}]\sigma}{4\pi r} = \frac{\Phi}{2\pi} \text{ ... (a) i.e.} \]

Equation (a) denotes that the Harmonic Oscillation due to Any-Force or Weight, which follows the free motion on Cycloid, is Independent of the Amplitude of oscillation and is Isochronous. This Property belongs to Photon also, since it is a Material-Point. [70]

Since Total-Energy $L = B w = \frac{1}{2} w^2$ then $2L = J.w^2$ and $B = m.v = \frac{1}{2} \pi^2 r^2 2\pi f = \pi^2 r^2 f$

From momentum relation $\vec{B} = m r \vec{v} = m r^2 (2\pi f) = \frac{1}{2} \pi^2 r^4 2[2\pi f]$ then Spin $\vec{S} = \vec{B}$

**Angular-momentum** $\vec{B} = \vec{S} = \frac{1}{2} \pi r^4 [2(2\pi f)] = \pi r^4 [f]$ \[ \vec{S} = \frac{[1 + \sqrt{5}]\sigma}{2\pi r} = \frac{[1 + \sqrt{5}]\sigma}{2\pi r} \]

Frequency of Photon is $f_n = \frac{[1 + \sqrt{5}]\sigma}{4\pi r}$, where $\Phi = \frac{1}{2\pi r} = 1.6180339887$ and $2r$ is The Diameter of Energy-Cave $AB = 2r$ of circle $(O,OA) = \text{Monad} \leftrightarrow \oplus \leftrightarrow \ominus \equiv 1 + \Phi$ and $BC = [\sigma] = \text{The Glue-Bond-Vector}$ from the main-Stresses magnitude. $M_{\text{motion}}$

ABCD = The Energy-Space Rectangular Parallelogram in Plane ABC.

ABFE = The Energy-Anti-space Rectangular Parallelogram in Plane ABC.

BF = $[\Phi.\sigma] = \text{The Anti-Space-Vector}$, and FG = $[\Phi] = \text{The Space-Vector}$ magnitude.

From Kepler 2nd Orbit laws the Unit-Quantized-Area, or Unit Quantized Energy is that per sec $\rightarrow r \phi$, following equation $1 = k.f^2 u r^3$, and expresses the area of triangles.

Triangle 2(ABC)=BC.BA = $[\sigma(\Phi + 1)] \equiv \sigma.\Phi + \sigma = [\text{Stress-In-Storage-}\Phi] + [\text{Moving-Stress}]$

Or $\text{Storage } S \equiv \[\text{Motion } M \equiv \vec{v} = \text{Vector}\]$ and from Figure 4-

Triangle 2(BFG) = FG.BF = $\sigma.\Phi(\Phi + 1) \equiv \sigma.\Phi + \sigma \equiv S_{\text{storage}} + M_{\text{motion}}$

Triangle 2(DEG) = EG.ED = $\sigma + \sigma \Phi \equiv \sigma.([1 + \Phi ] \equiv \sigma.\Phi + \sigma) \equiv S_{\text{storage}} + M_{\text{motion}}$

and since Energy = motion / $T \equiv \frac{(\frac{\sigma}{2\pi r})}{[\sigma + \sigma \Phi]} = \vec{v} \cdot \left(\frac{\sigma}{2\pi r} + \frac{\sigma \Phi}{2\pi r}\right) \equiv \vec{v} \cdot \left[ \vec{f}_n + f_n \right] = \vec{v} \cdot \vec{f}_n$

Moving - Storage $\rightarrow [\vec{v} \cdot \vec{f}_n] \leftarrow + \text{Moving-Frequency} \rightarrow [\vec{v} \cdot f_n] \leftarrow \equiv \text{Material-Point}$ i.e. The Energy produced in Photon-Cave is consisted of Two-moving-Storages, that travelling

as Particle $[\vec{v} \cdot \vec{f}_n] \rightarrow [\vec{v} = \vec{c} = \frac{f}{\Phi}] \rightarrow [S \equiv \text{EM-R} \equiv f_1 = n, f_2, f_3, f_4 \cdot f_n = w^2]$ and , as Wave $[\vec{v} \cdot f_n] \rightarrow \langle f_1 = (E^2 + H^2) = n \frac{(1 + \sqrt{5})\sigma}{4\pi r} \rangle \rightarrow \{W \equiv \text{EM-R} \equiv \{E^2 + \mu B^2\} = 2\sqrt{5} \text{c.sin.2}\Phi\}$

and as Duality of an Energy-Storage $S \equiv \{[\text{Particle } \vec{v} \cdot \vec{f}_n] \rightarrow [\vec{v} = \vec{c} = \frac{f}{\Phi}] \rightarrow \text{i.e. a Stationary Standing-Wave} \rightarrow [S \equiv \text{EM-R} \equiv f_1 = n, f_2, f_3, f_4 \cdot f_n = w^2].\}$

1. **Energy-Storage** $S \equiv \{[\text{Particle } \vec{v} \cdot \vec{f}_n] \rightarrow [\vec{v} = \vec{c} = \frac{f}{\Phi}] \rightarrow \text{i.e. a Stationary Standing-Wave} \rightarrow [S \equiv \text{EM-R} \equiv f_1 = n, f_2, f_3, f_4 \cdot f_n = w^2].\}$

2. **Energy-Motion** $M \equiv \{\vec{v} = \text{Vector}\} \rightarrow \text{Wave} \{\vec{f}_n \rightarrow \langle f_1 = (E^2 + H^2) = n \frac{(1 + \sqrt{5})\sigma}{4\pi r} \rangle \rightarrow \text{i.e. a Propagating Wave} \{W \equiv \text{EM-R} \equiv \{E^2 + \mu B^2\} = 2\sqrt{5} \text{c.sin.2}\Phi\}$. 19

Photon Particle, Photon Wave OR The Duality Photon ????
The Physical-Interpretation of $f_{\text{Photon}}$ :

Using the Material-Geometry-Vectors for the Anti-Space-Action then,

From Force $G_{\text{ON-Antispace}} = \overline{AB} \times \overline{BF} \equiv [\Phi + 1] \times \{ |\Phi|, \Phi \equiv \sigma, \Phi \} = \Phi^2.\sigma\Phi = \sigma.\Phi^3$ or ,

$G_{\text{AN}} = \overline{AB} \times \overline{BC} \equiv \sigma.\Phi^3 \equiv \overline{\sigma - \text{Stress}} \equiv \overline{[\sigma - \Phi \rightarrow \Theta] + \overline{[\sigma - \Phi \rightarrow \Theta] + \overline{[\sigma - \Phi \rightarrow \Theta]}}}$

and $\rightarrow\rightarrow\rightarrow$ Primary-Energy $\equiv G.f_p \equiv \hbar$ and OR $G^{-1} \times \sigma \times \Phi^3 \equiv 1 \leftarrow\leftarrow\leftarrow$ where $G = \text{The Newton's-Universal Force} = 6.680561.10^{-11}$ m3/Ns²

$\sigma = \text{The Glue-Bond-Stress in Material-Points} \equiv \sigma = \frac{2\pi r f}{c^2} = 1.85.10^{-11}$ Kg/m² and , $f_r$ in Planck's length $r = L_p = e^{-i(\pi/2).10}$ is Frequency $f_{\text{Planck}} = \frac{c}{2\pi r} = 2.95236210^{42}$ H , Planck's Length $L_p = e^{-i(\pi/2).10} = \left\{ \sqrt{3}.\pi, 1.616199.10^{-35} \text{ m} \right\}$

$\Phi = \text{The Golden-Ratio Pattern} \equiv \Phi = \frac{1+\sqrt{5}}{2} = 1.6180339887 \overline{c}$

It is seen that , in Universe exists the only one Force $G = \sigma.\Phi^3$ which is Acting on all Quantized-Quantities $\rightarrow G = \sigma.\Phi^3 \equiv \Phi^3 \left\{ [\sigma.\Phi^3] = 2\pi f_p \right\} \equiv w r \equiv \Psi = m a = \overline{c} \left\{ \right.$ and

From $\sigma \times \Phi^3 \equiv G \rightarrow [1.846462.10^{-11}],[3.618033989] = 6.680561.10^{-11}$ o.e.d.

i.e. Universe is a Monad , Becoming from a HUGE-MAGNET of Opposites $\oplus$ , $\ominus$ which Forms $\rightarrow$ The 3-Dimentional SPACES $\Phi$ , ANTI-SPACES $|\Phi,\sigma|$, and $\rightarrow$ The ENERGY $\equiv$ MOTION through the $G$ - Force and Stress - $\sigma$ becoming from Photon.

i.e. Ubiquity of Material-Geometry in Electromagnetism is Everywhere .

Remarks on the Duality-Photon $\rightarrow \{ \overline{\sigma} \left\{ f_n + \overline{\sigma} . f_n \right\} \leftarrow \}$ :

a. From equations $f = \sigma f_1 \Phi \overline{2\pi r}$ and $\sigma_1 . [1\pm (\sqrt{5})] / 2 = \sigma.\Phi$ , then frequency $f_p$ of Photon is Independent of the Amplitude $[\epsilon E^2 + \mu B^2]$ of the Vibration , it is Not-Damped and Not-Driven , and so can be related to Any-Force that can produce Energy as Wave and thus can be Quantized to a Monad .

b. Photon striking an Object of Microcosm or Macrocosm then . Is a Source that gives Energy as Energy-Storage , and Information as Propagating - Energy .

c. Photon in the Microcosm of Hydrogen - Cave can-Give such Potential-Energy as Resonance-Energy-Frequency $f_R$ , as that Energy in [ Bracket - Orbit - Hook ] which Joints the Atoms to produce the Molecules .

d. Photon striking on Hydrogen-Cave can Produce a Resonance-Energy-Frequency $f_R$ , such that can produce Photos and Images of Inter-Atom or any other Structures .

e. Photon striking on Cells can Produce a Resonance-Energy-Frequency $f_R$ , such that can Enter Cell and Break-It -Up .

The Kinetic-Energy $E_K$ of a moving Material-Point , as this is the Photon , is stored as motion in its Storage , $r_f = [ n \lambda / 2]$ with the , $n$ frequencies $f_n = n. f_1$ , with $n$ lobes and fundamental frequency $f_1$ . From above is seen the Passage and The - How EM-Radiation can travel in Crystals and which are the Cauchy-Stress-Tensor where $E.I.B.L r \equiv \sigma_1 \perp \sigma_2 \perp \sigma_3$ in-where Energy Propagates along Directions without Birefringence and carries the Energy Storage $r$ , which radiation is The conveyer .

Photon Particle , Photon Wave OR The Duality Photon
Above procedure can be used in Cells, where cells are cases of a Birefringence material and the Resonance-Passage happens as the Force of EM-Radiation in Two directions, can travel in Cell through Cauchy-stress-tensor where the two Conveyers $E \perp B \perp r \equiv \sigma_1 \perp \sigma_2 \perp \sigma_3$, can carry the Energy-Storage, $r$, in Cell. Interfacial Properties are detected from Surfactant, and change the Inner-Structure of Cell to another desirable Property. 15/3/2020

2d... The Origination of Stresses $\sigma$:

Gravitational-Constant-Force $G$, becomes as Stress $\equiv$ Force/Area $\equiv g$, as equation

$$G = g_k E = g \cdot [g_k E] = \left[ \frac{T}{a^2} \right] \cdot [g_k L] = \left[ \frac{F}{a^2} \right] \cdot [g_k L] = 9,8076925 \times 6,8116 \times 10^{-12} \equiv 6,68056.10^{-11} \text{m}^3 \text{N} s^{-2},$$

and Effects on gravity $\rightarrow g \equiv 9,8076925 \text{ Stress kg/m}^2$ [73]

The Beyond-Planck-length Force $F = \sigma \cdot \Phi = \text{The Glue-Bond} \equiv \text{Stress x Area} \equiv \left[ \frac{2 \pi f r}{\Phi} \right] = w \cdot r \left[ \frac{A}{\Phi} \right] = \vec{v} \left[ \frac{A}{\Phi} \right]$, and becomes a moving Storage $\frac{A}{\Phi}$ travelling with velocity $n$ times that of light-velocity $c$, as equation $\vec{v} = n \cdot c$.

The Beyond-Planck-Length Force is $\rightarrow F = \Phi^3 \cdot \left[ \frac{\sigma \cdot \Phi}{r} \right] = \sigma \cdot \Phi^3$ where, $\sigma \equiv \left[ \frac{\Phi \cdot \Phi}{r} \right] = \text{The Stress of Cave as the Quantized distance} r \rightarrow \left[ \frac{\Phi \cdot \Phi}{r} \right]$

and $\Phi = \left(1 + \frac{5}{2}\right)$ is the mould of Quantization, a kind of Impedance as in Electricity, so from Material-Point frequency $f = \frac{c}{2 \pi r} = 2,93949410^{42}$ Hz, and $\sigma = \frac{c}{\Phi}$. For the Planck length Stress $\sigma = \frac{2 \pi f r}{(n \Phi) = \frac{2 \pi f r}{1 \Phi}} = 2 \pi \cdot 1,616199.10^{-35} \cdot 2,93949410^{42} = 1,84456315.10^{10}$ kg/m2

$= 1,84456315.10^{11}$ Kg/m2, and the Angular velocity $w$, of Total-Planck Cave is,

$|w| = \frac{\sigma}{2r} \left[ 1 + \sqrt{5} \right] = \left( \frac{1,852816510^{11}}{2,1,616199.10^{-35}} \right) \cdot 1,6180339 = 9,274599.10^{46}$, rad/sec then

**Stress Outside Planck’s-Length-cave $\rightarrow \sigma_p$** $= 1,84456315.10^{11}$, and

$G = \sigma \cdot \Phi^3 = [1,84456315.10^{11}]$. [3,6180339887] $= 6 \cdot 673692.10^{-11}$ m$^3$ Ns$^{-2}$, Nevertheless,

For Earth-System mass $M_E = 5,9723.10^{24}$ Kg, and for Area $\rightarrow$ Radius 6378,137 Km $= 6,378.10^6$ m then Earth-constant $k_E = \left[ \frac{6,378.10^6}{5,9723.10^{24}} \right] = 6,811551810^{-12}$ and Gravitational Force $G = g_k E = g \cdot [g_k L] = \left[ \frac{T}{a^2} \right] \cdot [g_k L] = 9,8076925.611551810^{-12} = 6,68056.10^{-11}$ m$^3$ Ns$^{-2}$

Remarks:

a. The Stresses become from a Force and a Surface as equation $\sigma = \frac{F}{A}$, and in the case of Gravitational constant $G$ and a cave $r$, then $\rightarrow \sigma = \frac{G}{4 \pi r^2} = \frac{G}{\pi (2r)^2} = \frac{G}{\pi s^2}$, or vector $s$.

Above relation means that Force $G$ needs a Vector-surface $\pi.s^2$ to be spread as Stress $\sigma$ which is the case of Constant-light-velocity $c$ as the next.

b. The case of a vector $s$, is the Linear-Stress while of an Plane is the Surface-Stress and, consequently of a Volume is a Space-Stress, as this was referred before for $G$ Force.

d. Since Stresses follow equation $\sigma = \frac{F}{A} = \frac{2 \pi f r}{\Phi}$, conclusively Forces and Areas are everywhere and are related to any-cave $r$ through $f$, which is the mean of every-Information.
3d... The Origination of Light-velocity c and Photon :

Figure – 6 - : The light-velocity-Mechanism in Material-Geometry and The Photons :

In (1). Is The Beyond-Planck’s-length-Region where exists, The Gravitational-Constant G which is the Force G. The Photon is Particle + Wave ≡ Energy with light-velocity and its Duality is in frequency where \( \vec{v} = \vec{c} \cdot \left[ \frac{\vec{f}_p}{c} + \vec{f}_n \right] \). The Material-Points with velocities \( n.\vec{c} \), are as \( \vec{v}_m = n.\vec{c} \left[ \frac{\vec{f}_n}{c} + \vec{f}_n \right] \), where \( \vec{f}_n \) is the Stationary-Storage and \( \vec{f}_n \) is the

Propagating Electromagnetic-Radiation where \( \vec{E} = \vec{B} \cdot c \).

In (2). Is the Planck’s-length-Region in-where Exist → The Photon Particle + Wave ≡ Energy, with light-velocity and the Duality in frequency as \( \vec{v} = \vec{c} \cdot \left[ \frac{\vec{f}_p}{c} + \vec{f}_n \right] \) → The Primary-Particles Fermions and Bosons, with their Spin \( \vec{S} \), and according to the frequency \( f \), their velocity → The Constant-Light-velocity \( \vec{c} = \frac{G}{\Phi^2 \cdot L_F} \) → The Hydrogen Cave He from \( g.\vec{r}^3 \). \( f^2_p = 1 \) → The Electron-Charge and Electron from \( 4\pi^2 f^2 e . m_e = k = \pi g \) and \( 4\pi f^2 e . m_e = g \).

The Proof :

It was shown That → The Cycloidal-acceleration \( g_{cyclic} \) is transformed as Centrifugal acceleration and becomes the frequency of Photon as \( f_p = \frac{\sigma}{2\pi r} = \frac{\sigma \cdot \Phi}{2\pi \Phi} \), and Stress \( \sigma \) becoming from Space \( \bigoplus \) to Anti-Space \( \bigcirc \) as \( \sigma = \frac{2\pi r \cdot f}{\Phi} = \frac{w^2 m}{\Phi} = \vec{v} \) ……….(a)

It was proved that → Photon-Travels with velocity \( \vec{v} \cdot \left[ \frac{\vec{f}_n}{c} + \vec{f}_n \right] \), which is a Moving Stationary-Wave ≡ Storage → \( \vec{v} \cdot \left[ \frac{\vec{f}_n}{c} + \vec{f}_n \right] \) → The Energy produced in Photon - Cave is consisted of Two-Storages, that are travelling, as Particle \( \left[ \vec{v} \cdot \left[ \frac{\vec{f}_n}{c} \right] \right] \) → \[ \vec{v} = \vec{c} = \frac{\lambda f}{\Phi} \] → \( [S] ≡ EM-R ≡ \left[ f_{1=N}, f_{2}, f_{3}, f_{D} \right] \) → \( [W] ≡ EM-R ≡ \left[ \xi E^2 + \mu B^2 \right] = 2.\lambda c . \sin.2\Phi \) and, as Wave \( [f_1 = (E^2 + H^2) = \frac{(1 + \sqrt{5})\sigma}{4\pi r} = \frac{\vec{B}}{\pi^2 r^2}] \) → \( [W] ≡ EM-R \equiv \left[ \xi E^2 + \mu B^2 \right] = 2.\lambda c . \sin.2\Phi \)

and as Duality An Energy-Storage \( S \equiv \left[ [\bigoplus r \rightarrow \bigcirc] \right] + \text{Motion } M \equiv \vec{v} - \text{Vector} \)

Photon Particle, Photon Wave OR The Duality Photon ???
It was shown also that → **Energy** = motion / T = \( \frac{v}{2\pi r} \) \( [\sigma + \sigma \Phi] = \text{velocity} \)
\[ \equiv \vec{v} . [\frac{\sigma}{2\pi} + \frac{\sigma \Phi}{2\pi}] = \equiv \vec{v} . [\frac{f_n}{c} + f_n] \text{, consisted of the Two kinds of frequencies} \ldots(\text{b}) \]

From Force definition << A Force F is a **Push or a Pull** acting upon an Object as a result of its interaction with another Object >> or → in Material-Geometry

Push → → [\( \Theta \leftarrow \text{Push} \rightarrow \Theta \)] and [\( \Theta \leftarrow \text{Push} = \text{Force} \rightarrow \Theta \)] \( \equiv \text{Force} \)
Pull → → [\( \Theta \leftarrow \text{Pull} \rightarrow \Theta \)] and [\( \Theta \leftarrow \text{Pull} = \text{Force} \rightarrow \Theta \)] \( \equiv \text{Force} \)
i.e. Both cases Push or Pull are Forces \ldots(\text{c})

It was shown That → **Force F** becomes a Velocity-Vector \( \vec{v} \), as ,
**Force** = **Stress x Area** \( \equiv \sigma \times A \) and from (1) \( \rightarrow F = \sigma . A = \frac{2\pi r f}{\Phi} A = w r . [\frac{A}{\Phi}] = \vec{v} [\frac{A}{\Phi}] \)
and Because by definition **Angular-velocity** \( w = 2\pi f \) and **velocity** \( v = w r . \)
i.e. **Stress**, \( \sigma \), **enters in Monad-Space** \( \Phi \) as \( [\sigma \Phi] \) and **frequency becomes** \( \vec{f} = \frac{\sigma . \Phi . r}{2\pi r f} \)

and the Force \( F = \sigma . A = \frac{2\pi r f}{\Phi} A = w r . [\frac{A}{\Phi}] = \vec{v} [\frac{A}{\Phi}] \), becomes the moving Storage \( \frac{A}{\Phi} \).

Newton’s gravitational constant \( G \) is a Force directly proportional to the product of any two masses \( m_1 \), \( m_2 \) in macrocosm and inversely proportional to the square of the distance between their centres , instead of the microcosms Coulomb’s law of , two charges \( q_1 \), \( q_2 \).

From Mechanics , For area 0 = \(< A = < 0 \), The Extreme case , where Surface is interchanged as line or as line-segment , and is the same as the infinite small , \( ds \), in Calculus , where stresses \( \sigma 2 = 0 \) and \( \tau_{12} \) are very small , it is the equation of stresses \( \sigma 1, 2 \), or is \( \sigma 1 / 2 = \pm (\frac{\tau}{2}) \sqrt{\sigma 1^2 + 4. \sigma 1^2} = \sigma 1 . [\pm (\sqrt{5})]/2 = \sigma \Phi \), and is the Golden-Ratio - Pattern of the Material-Point as type of a vanishing-shear due to layers laterally shifted .

According to Cauchy , the stress \( \sigma \), at any Point in an Object assumed as continuum and loaded by an external Force , \( F \), is defined by nine stress components as a second order Tensor ,the Cauchy-Stress-Tensor and Force for the One Dimension extreme-case \( F = \sigma \Phi \), while for the three –Dimension extreme-cases \( F = \sigma \Phi^3 \), and represents the Equal Apportion of the External-Force to the Internal-Forces .

According to Material-Geometry Distance \( \equiv \) [\( \Theta \leftarrow r \rightarrow \Theta \)] , and Stress \( \equiv \Phi \), [\( \Theta \leftarrow \sigma \Theta \)] and for the three-Dimesion extreme-cases \( \Phi^3 \), [\( \Theta \leftarrow \Theta \)] \( \equiv \text{Force} \) \( F = \Phi^3 \).
i.e. **Forces Beyond-Planck-Length are** → \( F = \Phi^3 \) , [\( \Theta \leftarrow \sigma \Theta \)] \( = \sigma x \Phi^3 \) \( \leftarrow \ldots \)(\text{d})

Force \( G \) → on Spinning M-Points \( \vec{S} \) through \( \vec{g} \) → on Planck’s - \( \vec{B} \) → on \( g_G \) , through \( f_R \)
\( G = \sigma \Phi^3 \), and \( \sigma = \frac{G}{\Phi} = \frac{6.\sigma \Phi}{c^2} \),or → \( \Phi^2 \) \( \Gamma = \Phi^3 \ldots(\text{e}) \), where \( \sigma \) is a Stress between frequencies .

From Force-relation \( F = \sigma A = (2\pi f r) \frac{A}{\Phi} = w r \frac{A}{\Phi} = \vec{v} \frac{A}{\Phi} \), is seen also force \( G \) become velocity \( \vec{v} \). In the case of Planck’s-length velocity \( \vec{c} = w r = \frac{G.r}{\Phi} = \sigma x \Phi \equiv \frac{G.r}{L_p \Phi^4} \equiv \Phi \equiv \frac{G.r}{\Phi^2 L_p} \)
and from relation \( G = \sigma \Phi^3 \) then → [\( \vec{c} = \frac{G.r}{\Phi^2 L_p} \)] which is the Light-velocity vector .

Since \( r \), becomes from the Beyond-Planck’s-Region then → \( \vec{v} = \frac{G \Phi}{A} = [\frac{G \Phi}{A}] \) \ldots(\text{f})

Photo Particle , Photon Wave OR The Duality Photon ???
Equation (f) may be written as Force \( G = \mathbf{v} \frac{A}{\Phi} \), which is a Viscous-Damping-Force where \( \frac{A}{\Phi} \) is a constant of Proportionality and the equation of motion is \( F_G = \left[ \frac{A}{\Phi} \right] \cdot \mathbf{x} \). Force \( G \) is applied in all Quantized-Universe \( A \) as Velocity \( \mathbf{c} \) and as Stress \( \sigma \) on Spaces Anti-spaces as Spaces-relation \( L_p = e^{i(\frac{4}{4} \cdot 2k)} \cdot b \), where from Material-Geometry [24-58], Space \( \equiv 1 \) and Anti-Space \( \equiv \sqrt{\pi} = +1 \), - 1 , and \( \sqrt{-1} = i \) = The Imaginary Part into the \( \rightarrow \)

Anti-Space + Space = motion \( \equiv \) i \( \equiv 2\sqrt{-1} = 4\sqrt{1} = e^{-i(\frac{4}{4})} \cdot b = 0.707106781 \cdot b \).

The Base \( b \), which for Natural logarithms issues << The Natural logarithm \( \ln(x) \) of a Magnitude \( x \), is the Power to which \( e \), would have to be raised to equal \( x >> \) and Defining that \( \rightarrow \ln(x) \) is the Period-needed to Grow \( x \), as this is in Integration \( \int x \). \( e^x \) is the Amount of Growth after Period \( x \) and the Possible-Repetitive-Permutations for moulds and elements which is Mould Elements = The - Growth-Periods i.e. when Mould = Elements then is succeeded maximum and for \( e \) is \( e^e \), and any \( \log x \). For \( \log x \) and Base \( x = 10 \) then \( \log_{10} 10 = 10^0 \) and for the two elements \( \{ \oplus, \ominus \} \)

is \( 10^{[10]} = 10^{20} \) Positions \( \equiv \) Distances \( \equiv r \) and since \( 10^{-x} = \frac{1}{10^x} \) then \( b = 10^{-20} \), and Anti-Space + Space-Positions are, 0,707106781.10^{-20} = 1, 0707106781.10^{-19}. In this Way The Non-Dimensional-number [0,707106781] \( \cdot 10^{-1} = 1, 0707106781 \).

Is Quantized in cave , \( r \), as distance and Becomes The-Dimensional-Space in the Decimal - System \( b = 10 \) as cave \( r \), and which cave is \( r = 1, 0707106781 \) or , \( r \) =1, 0707106781 m , having Unit-Area \( \pi.r^2 = 3.601588 \) m2 , and the QUA-Universe is A = 3.601588 . \( 10^{-19} \) m2/s , which are The Space + Anti-Space Positions in Universe ... (i)

From (h) , light-velocity \( \mathbf{v} = \frac{G \Phi}{A} = \frac{6.673692.10^{-11}1.6180339887}{3.601588.10^{-19}} = 2.99819938 .10^8 \) m/s

i.e. Force \( G \equiv \) motion , is Quantized \( \rightarrow \) Spread in \{ Space and Anti-Space \}

or \( = \) QUA \( = \{ \) The Quantized-Units-In-Area of Space and Anti-space \}, and as mould \( \Phi \) exists in the Impedance \( b \).

Impedance in Mechanics is the Friction Coefficient , where for Force \( G \) be Proportional to the Light-velocity \( \mathbf{c} = \mathbf{v} \), then the Harmonic – Oscillation is an Damped-Oscillator , and Can-Oscillate due to the excitation as ,

a.. with a frequency lower than in the Undamped case and an Amplitude Decreasing with time , the Under-Damped-Oscillator which Originates the Quantum of motion which is a limiting case between the oscillatory and Non-Oscillatory motion the Critical Damping , and which Originates the Light-velocity \( \mathbf{c} \), [49]

b.. with Undamped case frequency and Decay to the Equilibrium-Position without oscillation and The Over-Damped-Oscillator Originating the n-times-c .

What is Quantization of motion and Impedance is analytically referred in [83]

A Parallel solution becomes also from the attendant logic ,

The Three Elements \( \equiv \) Digits of Material-Geometry are \( \{ \oplus , [\oplus \leftrightarrow \ominus] , \ominus \} \equiv [+, 0 , -] \)

The Permutation , arrangement , of the Two-Elements \( P_2^1 = 2 \), is \( \rightarrow [\oplus,\ominus] - [\ominus,\oplus] \)

Photon Particle , Photon Wave \ OR The Duality Photon ???

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The Three-Elements in Space need $P^3 = 3.(3-1).(3-2) = 6$ Positions and the same for
Three-Elements in Anti-Space need $P^3 = 3.(3-1).(3-2) = 6$ Positions, and Total Places →
$P^3 = 6 \times 6 = 36$ Positions for Spaces and Anti-Spaces as Impedance, and as before
for $\log_x x$ and Base $x = 10$ then $\log_{10} 10 = 10^{10}$ and for the two elements $[\oplus, \ominus]$ the
Growth is $10^{10^2} = 10^{20}$ Positions $\equiv$ Distances $\equiv r$, and since issues $10^{-x} = \frac{1}{10^x}$ then
$b = 36.10^{-20}$, and $\rightarrow \overline{v} = \frac{F \Phi}{n} = [\frac{G \Phi}{A}] = |\frac{6.673692.10^{-11}.1.6180339887}{36.10^{-20}}| = 2.9995163. 10^8$ m/s
Ubiquity of Material-Geometry in Electromagnetism is Everywhere. 22/3/2020
4d... The Origination of Gravity $g$, from velocity $c$

A... The Gravity-System, is an Infinite of $\pm$ Equilibrium-Rotating vectors $\overline{r}$, where for Stability $\uparrow \overline{r} \downarrow \overline{r} = 0$, and which Gravity-System interacts with Hydrogen-Cave-Systems.
The condition for Irrotational Energy is $\rightarrow \nabla x B = 0$, or $\nabla x B = \nabla f + 2\pi \text{ m𝑓.} \overline{a} = 0$, and
$\overline{r} = \pm 2\text{ m𝑓.} \overline{a}$. Vector $\overline{r}$, occupies Both directions for Rotational-equilibrium, i.e.
The vector $\overline{r} = \pm \overline{B} \equiv \overline{S}_n = 2\text{ m𝑓.} \overline{a}$, and $f_n = \frac{B}{2\pi m_e} = \frac{E}{h}$ is the Stationary-Filling-Ocean
of the Spinning-Gravity-Material-Point, in the called Empty-Space, with frequency that
of Material-Point $f_n = n. f \equiv = \frac{E_n}{h} = \frac{n. \nu}{2\pi n} = \frac{n. \nu}{4\pi \sqrt{1+\nu^2}} = \frac{2\pi n}{\sqrt{1-\nu^2}}$, and from $v = \omega = 2\pi f \omega$ then
$f_n = \frac{n. \nu}{2\pi n} = \frac{1+\sqrt{5}}{4\pi n} = \frac{2\pi n}{\sqrt{1-\frac{\nu^2}{2}}}$, and $\overline{v} = \sigma \cdot \Phi ...(a)$, and $\pm \text{ Spin } S_G = B = J = \omega = \pi^2 \cdot \nu \cdot f_n = g$
Gravitational Constant Force $\equiv G$, is Spread -over a minimum - Surface, the Layer or Conducter or, a-Surface, or The-Permissible-Path, in-where exists Reaction as mass.

From the Energy-force $F_g$ in any cave, $r = L_p$ of Planck’s scale of any reaction to a
change of motion and which is mass the $m_g = J. w^2$ and in Electricity Impedance, where angular-velocity $w = \frac{c}{r}$ and in the 3-Dimensional Space of the Two Elements
$\left[ 2^1 = \Theta \leftrightarrow \Theta \right]^3$. The Impedance, $g Z$, of the Space is $\rightarrow \ln(3) \leftarrow$ and of Anti-Space is $\rightarrow \pi \sqrt{3} \leftarrow$ and this because consist the moulds of Growth [45]. From above,
$\rightarrow$ The Light velocity vector $\overline{v} = \overline{c}$ is Acting on cave, $r = L_p$, and finding Impedance
$\overline{m}_g$ becomes the Centrifugal-Force $F_g$ of Cave and is Equal to Gravity $g \leftarrow$ as
$F_g = m_g \left[ \frac{c^2}{r} \right] = J \cdot w^2 \cdot \frac{c^2}{r} \cdot g Z = \left[ \frac{c^2}{r} \right] \cdot \left[ \frac{c}{r} \right]^2 \cdot \left[ \frac{2^3}{2} \cdot \ln(3) \cdot \pi \sqrt{3} \right] = 4 \sqrt{3} \ln(3) \cdot \pi^2 \cdot r \cdot c^4$ , or

Gravity $\rightarrow \overline{g} = 4 \sqrt{3} \ln(3) \cdot \pi^2 \cdot L_p \cdot c^4 \leftarrow$ Is a Force between The Spinning $S_{pg} = \overline{B}$ and $F_g = \overline{g} = 4 \sqrt{3} \cdot 1.0986122886681.0^2.1.616199.10^{-35} \cdot [2.99819938]^4 = 9 \cdot 8076754$
i.e. Gravity $\overline{g}$, is The effection of $G$ force, on $\overline{c}$, light-velocity in the 3-Dimensional Space and Anti-Space, $2^3$, which is the Planck-length $L_p = r$.
Velocity-vector $\overline{v} \equiv \overline{c} = \left[ \frac{G \Phi}{A} \right]$ and Gravity-vector $\overline{g} = 4 \sqrt{3} \ln(3) \cdot \pi^2 \cdot L_p \cdot c^4$ are both Constants because $\{ G \cdot \Phi \cdot A \equiv \overline{b} \cdot \text{Impedance} \}$ are all constants.
From Inner-velocity equation $v = \omega r = (2\pi /T) r = 2\pi f_1$, the wavelength $\lambda = c$, $T = c / f_1$, cave $r = n.(\lambda /2)$, then $r = n.(c/2f_1)$ and $v = 2\pi f_1[n.c/2f_1] = n.\pi. c$ or $v = n.\pi. c \ldots (k)$

Photon Particle, Photon Wave OR The Duality Photon
Showing that velocities in lobes are \( n, \pi, e \) times that of light and for \( n = 1 \) then \( v = \pi, c \) more than three times faster of light velocity, and is the Velocity-Quantization.

From velocity \( v = n, \pi, e \), is seen that light-velocity is the Quantum of Unit-velocity in \( L_p \). From above In-Planck’s-length velocity \( \vec{c} = w = r = \frac{\sigma \Phi}{r_n} \) then \( \Phi = \frac{G r}{L_p \Phi^3} \) and from relation \( G \equiv \sigma \times \Phi^3 \) then \( \vec{c} = \frac{G r}{\Phi^3 L_p} \) \( \vec{c} \rightarrow \) which is Light-velocity in \( L_p \).

For the Out-Planck’s-length velocity equation \( \vec{v}_m = n, \vec{c} \cdot \{ f_n + f_n \} \) and from equation \( \vec{v}_m = w = r = n, \pi, e \cdot f = \frac{n, c}{2r} \), then \( \vec{v}_m = n, \vec{c} \cdot \{ f_n + f_n \} \rightarrow \) which is velocity-Out \( L_p \).

Photon was proved to be a Material-point in cave, \( r \), where its Inner Storage is the Stationary-Standing-wave the Electromagnetic-Wave \( [E^2+H^2] = 2(2r) . c . \sin 2\phi \) with \( n \) Lobes representing the Normal mode vibration with frequencies \( f_n \). \( f_1 = \frac{E}{h} = \frac{n, c}{4r} = \frac{n, \sigma}{8r} [1+\sqrt{5}] \), and Outward the Storage is the Propagating Electromagnetic-Wave. → \( [\varepsilon E^2+\mu B^2] = 2. \lambda c \sin 2\phi \) where Particle \( 2r = n \lambda, \) Cave \( r \), is the Electromagnetic - Energy-Storage, and Electromagnetic-Radiation \( E, B \), is the Wave Conveyer of Cave \( r \), with frequency \( f = E / h \), or \( f = E / h \). (Figure - 6), i.e.

Gravity \( \vec{g} \), is The effect of \( G \) Force, on \( c \) light-velocity, in the 3-Dimensional Space and Anti-Space, \( 2^3 \), of Planck-length \( L_p = r \). For more analysis in [69] from relation \( \sigma \times \Phi^3 \equiv G \rightarrow [1,845632.10^{11}], [3,6180339887] = 6,673692.10^{-11} \) q.e.d.

5d... The Origination of Electron e, and e - Charge : Electron is created through the vibration, \( f_n \), in the Energy-Space, \( g \cdot \pi \), meters and follows both Rotational and Linear motion and so Constant-Energy \( k \) is the same.

From M-Point, frequency \( f_n = n \frac{(1+\sqrt{5})\sigma}{4r} \), then \( w = 2\pi f_n = n \frac{(1+\sqrt{5})\sigma}{2r} = \frac{n, c}{2r^2} \) \( \sigma \rightarrow \) as equation \( \vec{x} \) \( + w^2 \) \( x = 0 \) … (1a) with a general solution \( x = A \sin \omega_n t + B \cos \omega_n t \), where \( A, B \) are constants and evaluated from the initial conditions and which become \( x = [\dot{x}(0) / \omega_n], \sin \omega_n t + x(0). \cos \omega_n t \) ……(1)

The Natural-frequency in Planck’s length for the Primary-Particle occupying the less Negative-charge-frequency, is the Electron, and is as equation (1) with solution, \( \omega_n = \frac{1}{2\pi} \sqrt{\frac{k}{m}} \), or \( 4 \pi^2 \omega_n^2 e \cdot m_e = k = \pi g \) and \( \rightarrow m_e = \frac{g}{4 \pi^2 f_e^2} \) ……(2)

where \( k \) = Unit-Spring-Force \( \equiv [\text{meter of area}], [\text{meter of force}] \equiv \pi g \) ……(2a)

From Planck’s equation \( f_e = E / h = [-13.6 \times 1.6.10^{-19}] = 2.176.10^{-18} \) Joule] / [ 6,626.10^{-34} J.s ] = 3, 283998.10^{15} s, where min-energy -13.6 eV is Hydrogen-atom

Substituting all the minimum-meters of Planck’s scale then, Electron mass is, \( m_e = \frac{g}{4 \pi^2 f_e^2} = \frac{9.8076754}{4.\pi [3.283999.10^{15}]} \) = - 7, 2371149.10^{-32} kg ……(2b)

\( f_e = 3, 283998.10^{15} \) /s, and \( L_e = 1, 6819781.10^{-17} \) m ………(2c)

Equations become from relation \( \rightarrow 4 \pi \cdot f_e^2 \cdot m_e = g \) \( \rightarrow \) In Planck’s length.

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**Electron-Charge**, becomes from the *Periodic excitation* of the motion of the, \(\bigcirc\), constituent to the \(\bigcirc\) constituent, *Tack-Geometry*, **Not** in loop \((\bigcirc\leftrightarrow\bigcirc)\), *But* through the **One way**- N -Electric-Paths \([\bigcirc\leftrightarrow\bigcirc]\), which formulate the **Electric Field- Pattern**, following charge-equation \(\vec{q} = \frac{m_e c^2}{2}\). From *Gravitation* \(G = k_e \cdot g\), and Voltage \(\vec{V} \equiv V_p = \frac{c \cdot \vec{q}}{h}\), Spin = \(B / \pi\), where Electrons-equation of motion into \(\bigcirc\leftrightarrow\bigcirc\) is \(\vec{r} + w \cdot \vec{v} = \vec{0}\), and equation’s Solution \(\rightarrow 4\pi f^2 e \cdot m_e = g\) which is the **Electron**, and **Charges**, \(\vec{q}\).

**Electron Charge \(\vec{q}\)** Becomes from Magnetic Field \(\textbf{M}\) which creates the Electric-Field \(\textbf{E}\), which is acting on Charge \(\vec{q}\), and the acting Force per second creates Work which is conserved and coincide with the Planck’s constant \(h\). This is because \(h\) \(\rightarrow J = \text{N m s = Power}\), where from, *Energy = Power x Time*, issues the Beyond Planck’s length \(L_p\), & Voltage \(V\) as \(\vec{q} \equiv r \cdot \frac{k_e}{V_p = 1} = \frac{m_e c^2}{2} = \frac{e c^2}{8\pi^2 f}\), and \(\vec{V} \equiv V_p = \frac{c \cdot \vec{q}}{h}\). Using the two Energy-equations for **Plane-motion** \(\rightarrow f_n = \frac{\sqrt{k}}{2\pi \sqrt{m}}\) and **Orbital-motion**

\[a = \frac{3}{\sqrt{k} f^2}\], for Unit-Energy-Space-frequency \(k = g\), \(a = \pi\), then \(\rightarrow g \cdot f^2 \cdot \pi^3 = 1\) ....(4)

Frequency \(f_n = \frac{2}{\sqrt{k} \cdot \pi} = \frac{1}{2} \frac{1}{\sqrt{9.808238 \cdot \pi^3}} = 1,8133418 \cdot 10^{-3}\), i.e. The **Unit-Charge-Cave** \(\vec{q}\) into Hydrogen cave \([a = 1,82043047.10^{-12}\text{m}], [1,813342.10^{-3} / s] = 3,3010625.10^{-15}\text{C}\)

From equations Charge and Voltage is the **Self-Growing** Property of frequency \(f_n\) in Material-point, therefore and for Hydrogen-cave is equal to \(\rightarrow \vec{q} \cdot \Phi\).

**Because Gravitational Force** is equal to \(\rightarrow\) the Geometric-Resultant of light-velocity \(c\), acting on **Electron-Unit-Charge** \(\vec{q} \leftrightarrow\) or, \(G = c \cdot \sqrt{2} \cdot \vec{q}\), then Electron-Charge is \(\vec{q}_{\text{Electron}} = \frac{G}{c \cdot \sqrt{2}} = \frac{6,6736923 \cdot 10^{-11}}{1,414292 \cdot 9979346.10^8} = 1,574.10^{-19}\text{C}\).

For **Photon** issues that of Gravitation in Planck’s cave \(\rightarrow G = f_n \cdot \sqrt{2} \cdot \vec{q}\) and for Photon is,

\[\vec{q}_{\text{Photon}} = \frac{G}{\sqrt{2} \cdot f_n} = \frac{G \cdot h}{\sqrt{2} \cdot E} = \frac{[6,6736923 \cdot 10^{-11}] \cdot [6,62606975.10^{-34}]}{\sqrt{2} \cdot E = 1} = 3,127 10^{-44}\text{C}\).

6d... The **Origination of Hydrogen - Cave** \(H, e\):

The Light velocity vector \(\vec{v} = \vec{c}\) is Acting on cave, \(r = L_p\), and finding Impedance the mass \(m_B\), Becomes the Centrifugal-Force \(F_g\) of Cave and is Equal to Gravity \(g\), **while** The **Light velocity vector** \(\vec{v} = \vec{c}\) Acting on **an-cave**, \(r \neq L_p\), finds The-Impedance \(Z_c\) of the Velocity \(\vec{c}\), and Becomes the minimum-Energy-cave in \(L_p\), and Equal to \(E \equiv r \cdot Z_c \cdot \vec{c}\) ....(1) where, \(E =\) The Planck’s Total-Energy \(E_p = h = 6,62606957.10^{-34}\text{J.s}\), \(r = \) The min-Energy cave of Hydrogen, \(Z_c = \) The Total Impedance in Universe \(= \) Space + Anti-Space from velocity motion, \(\vec{c}\) = The light-velocity in m/s. Equation (1) becomes \(\rightarrow r Z_c c = h \rightleftharpoons \) ....(1a)

The **Three Elements** = Digits of Material-Geometry are \(\{\bigcirc\}, \{[\bigcirc\leftrightarrow\bigcirc], \bigcirc\}\) \(⇌\{+,-,0\}\) and as before for \(\log x\) and Base \(x = 10\) then \(\log_{10} 10 = 10^{10}\) is the Growth, **Impedance is the Anti-Growth** or **Anti-logarithms** \(10^{-10}\) of their Positions and Antilog \(r_{10} = 3\) is \(r = 0,477777\).

For the three dimensions Total-Impedance \(Z_c = (0,477777)^3.(10^{-10}) = 1,045263.10^{-31}\) and

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From Kepler third law, Closed-Space-Energy equation of Newton’s Laws of motion is

\[ \frac{\mathbf{r}}{cZ_e} = \frac{[6.62606957.10^{-34}]}{2.99798.10^8.1.045263.10^{-31}} = 2.11450164.10^{-11} \text{ m}, \] and is the Hydrogen cave.

**Quantity of Energy-cave and is that of Hydrogen-Atom**, where issues,

\[ g \mathbf{f}^2 = \text{The Energy-Part} \] embodied with stress, \( g \), and

\[ \text{cave a}^3 = \text{The Space-Part}, \] in the 3-DOF space, as Period and Frequency,

\[ T^2 = g a^3 = 9, 8076925 \times [2.1145016.10^{-11}]^3 = 9.2728158.10^{-32} \text{ s}, \] and Period

\[ T = 3.04513.10^{-16} \text{ s}, \] for frequency \( f = 3.2839982.10^{15} / s = 3.2839982.10^{15} \text{ H} \)

From equation \( E = h f = 6.62607.10^{-34} \times 3.2839982.10^{15} = 2.175999.10^{-18} J/(1.6.10^{-19}) \)

\[ = 13, 59999 \text{ eV a Quantized Energy corresponding to Hydrogen-Atom-cave}. \]

Above Quantity is the Quantum-Energy in the minimum cave of \( L_p \)

It was shown that in Conservative Systems of Central-Force, the Total energy \( E \) is

\[ \text{conserved and at Periapsis, Energy} E = \frac{G M m}{2a} \] and \( e = \sqrt{1 + 2E l^2 / G^2 M^2 m^3} \),

and for \( e = 0, a \text{ circle} \), then → \( E = - \frac{G M^2 m^3}{2L^2} \), i.e. energy is always Negative.

From Hydrogen cave issues \( k = E = \frac{T^2}{a^2} = g = \frac{4\pi^2 a}{GM} \) therefore, \( GM = \frac{4\pi^2 a}{g} \) and from

Total-energy \( E = - \frac{G M m}{2a} \), Rotational-Momentum \( L = \sqrt{(1 - e^2)}, GM^2 a \), the

eccentricity \( e = 0, \) \( G M m = - 2aE \), and then → \( L^2 = GMm^3.a = - 2aE[a]m = - 2a^2.Em \). i.e. \( \text{Equation} L^2 = - 2aE.Em \), Denotes that Angular-Momentum \( L \equiv B \) in the Circular Orbit Rims is always Negative and equal to \( L = - a \sqrt{2EM} \), while \( E = - L^2 / 2ma^2 \).

The lightest and the less-Energy \( Z_c \) = mass Particle of this universe, is the Hydrogen with the minimum Quantized - Energy of \( 13,6 \text{ eV} \). In-Spaces or Volumes with the minimum energy is formulated the, Hydrogen - cave, by oscillating under the action of the Inherent forces in M-Points and which are the Instruments that, Golden -Ratio- frequency uses to Kick-Start everything In this world. Both motions, the Periodic and Rotational, exist as the Mean between the Two Primary - Opposite in PNS ≡ Primary-Neutral-Space.

This Mean is the Ocean of the, Two kinds of Spins created from the inner motion in

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Material-Points both Oriented by the acceleration $g$, created from the Rotational-motion and which $g$, continually effects on Spins through which force $G$, Flows to all Energy Structures.

The Strong-force in Nucleus are in, $F_{\text{nucleus}} = h \cdot f_n \equiv h \cdot n \cdot \left( 1 + \frac{\sqrt{5}}{2} \right) \sigma \equiv h \cdot \frac{\sqrt{5}}{2} \pi \sigma \approx 5.10^{10}$ Tesla, and $F_{\text{photon}} = \frac{\sqrt{5}}{2} \pi \sigma \equiv h \cdot n \cdot \frac{\sqrt{5}}{2} \pi \sigma \equiv h \cdot \frac{\sqrt{5}}{2} \pi \sigma \approx 5.10^{10}$ Tesla. From $r_{\text{min}} = 1.07 \times 10^{-7}$ m and $f_{\text{p}}^2 = \frac{1}{r^2}$ or $f_{\text{min}} = 2.839844.10^{10} \text{H}$, then Bonding Energy $L = h f N = 6.62607.10^{-33}$. $2.839844.10^{10} J / 1.6.10^{-19} = 1, 176063.10^{-6}$ eV $E = L^2 / 2a^2$ and for $a = r \rightarrow a^2 = L^2 / 2E = \frac{1.176066.10^{-6}}{2(13.67.10^{-15})} = 5.08501.10^{-4}$ and then, $r = a = 2, 2549966.10^{-2}$ m, meaning The Spin-Poliodhe of the Hydrogen-cave.

From Orbit equation $a = \frac{1}{\sqrt{gI^2}} = \frac{1}{\sqrt{9.808(2.839844.10^{10})}} = 5.0189.10^{-8}$ m, to are the Brackets $[\text{Proton-Electron-Hook]} \equiv [\text{Electric-Field--Loops}] \rightarrow H-Atom-Radius$.

E.. : THE ORIGIN OF SPIN AND ENERGY:

It is an Application to Material-Points $[\bigcirc \leftrightarrow \bigcirc]$, by considering the Positive-constituent with angular velocity $\bar{w} = \bar{v} / r = \frac{\sigma}{2r} [1 + \sqrt{5}] \ldots (1)$ [70] and for an angle $45^\circ$ from, $x$, axis, where then the Ellipsoid of Angular-velocity is perpendicular to the Plane of motion.

Moment of Inertia to, $z$, axis is that of Sphere equal to $J_3 = \frac{\pi r^4}{2}$ which is the same in all Principal axes, and exists, $J = J_1 = J_2 = J_3 = \frac{\pi r^4}{2}$, therefore Angular-Kinetic-Energy $= \text{Angular-velocity-Ellipsoid}$ and then becomes, $J_1 w_1^2 + J_2 w_2^2 + J_3 w_3^2 = 2E$ ....(2)

The Energy-Ellipsoid as $\bar{B} \equiv \bar{\text{Spin}}$ is $\rightarrow \bar{w}_1^2 + \bar{w}_2^2 + \bar{w}_3^2 = \frac{2E}{J^2} = \frac{4E}{(\pi r)^2} = \frac{B^2}{J^2}$.

Angular-momentum $\equiv \text{Spin} \equiv \bar{B} \equiv [\pi \sigma r^3 (1 + \sqrt{5}) / 4]$ ....(3) In Figure - 6- and for the center, $K$, of $\bigcirc$ sphere, issues $\bar{K}_V = [\bar{w} \cdot \bar{r}_K] = \frac{[\sigma(1 + \sqrt{5}) / 2r] \sigma}{[1 + \sqrt{5}]} = \frac{[r \sigma (1 + \sqrt{5})]}{2r}$ and for $m = 1$ then $\bar{B} \equiv [r \sigma (1 + \sqrt{5})]$. The Interchangeable Ellipsoids of Angular velocity [70-494], and Momentum for the same Moment of Inertia is $J_1 = J_2 = J_3 = J_0$, and Angular velocity $\bar{w}_1 = \bar{w}_2 = \bar{w}_3 = \bar{w}$, the Momentum $B_1 = B_2 = B_3 = B$ becomes $3J w^2 = C$ and $3B^2 / J = C$ and since for circle $J = \frac{\pi r^4}{2}$ then $3 \frac{\pi r^4}{2} w^2 = C = \frac{(3\pi r^4)}{2} w^2 = \frac{(3\pi r^4)}{2} (\pi r v)^2 = \frac{3\pi r^4}{2} [\sigma (1 + \sqrt{5})] ^2 = 3\pi r^2 \sigma [3 + \sqrt{5}] \rightarrow \text{The Ellipsoid of Angular-velocity,} \bar{\omega}$, and $3B^2 / J = \frac{3\pi r^4}{2} \frac{(\pi r v)^2}{J} = \frac{3\pi r^4}{2} \frac{2\pi r^2 \sigma [3 + \sqrt{5}]}{\pi r v} = \frac{3\pi r^4 [3 + \sqrt{5}]}{2\pi r v} \rightarrow \text{The Momentum-Ellipsoid,} \bar{B}$. The Angular-momentum In Planck’s-Length $\equiv \text{Spin} \equiv \bar{B} \equiv [\pi \sigma r^4 f] \ldots (3)$

The value of $[B] = [2, 8, 79455.10^{-35}] \text{.} 1. 16180339] = 2.845976.10^{-34}$ [Kg/m/s]. For Planck-Length $r_p = 1.61623.10^{-35} \sqrt{3} \pi = 8.79455.10^{-35}$ m. velocity $\bar{v} = \frac{\sigma}{r} [1 + \sqrt{5}]$ and from (3) then $\rightarrow$ Planck-cave-Stress $\sigma = \frac{\bar{B}}{r \cdot \Phi} = 1$, Total-Energy $2E = [J \omega]^2$.

From $\bar{v} = \frac{\sigma}{2r} [1 + \sqrt{5}] = c = 3.10^8$ m/s then $\sigma = \frac{3.10^8}{3.679551.10^{34}} = 8.147733.10^{-27}$ Kg/m$^2$. $|w| = \frac{\sigma}{2r} [1 + \sqrt{5}] = \frac{8.147733.10^{-27}}{2.8794510^{53}} = 3.2360675 = 1.499.10^8$, or $|w| = 1, 5.10^8$ rad / sec.

For $\sigma = 8.147733.10^{-27}$ Kg/m$^2$ and $\bar{B} = 5.691952.10^{-34}$ J then, Period $T = \frac{2\pi}{w} = \frac{2\pi r}{v}$.

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Elliptical Motion occurs from Electrons with
Atom is a Finite Particles Reciprocating
In Mechanics the on must be kept,
In order that

\[ \text{Work } \equiv \text{Energy } \equiv \text{motion is Force (x)Displacement and is conserved.} \]

The two elements in Nature are

\[ \text{Energy } \equiv \text{Motion} \]

\[ \text{Space } \equiv \text{Displacement} \]

In Mechanics Work \equiv Energy \equiv motion is Force (x)Displacement and is conserved.

In order that Motion is Conserved as Displacement in all directions, then this Displacement must be kept, Quantized, in a Finite Space differently is annihilated.

In Mechanics the only-possible motion in a Finite Space, is the Periodic excitation \[ (\rightarrow \leftarrow \leftrightarrow) \] or, Reciprocating-motion, and the Revolving motion \[ (\Theta \cup \Phi \Theta) \] which defines the Quality of Particles. The Rotational motion defines different Period or frequency or Energy.

Atom is a Finite-Energy-Space in where exists motion \equiv Energy \equiv Force x Orbit-ray. Motion occurs from Electrons with Impedance \[ Z_e = \text{mass [m]} \] executing Circular and Elliptical-Plane-Orbits from Nucleus mass [M] obeying Kepler's laws and Newton's Lagrange laws for Mechanics in an Equivalent System. Lagrange equations of motion in any Potential is

\[ \frac{d}{dt} \frac{\partial L_a}{\partial v_i} - \frac{\partial L_a}{\partial q_i} = 0 \]

where, Lagrangian \[ L_a = (T_K - L) \ldots (1) \] and

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\[ L = \text{The Potential Energy} \equiv \text{Pointy motion} \equiv \text{Spin} \]
\[ T_K = \text{Kinetic-Energy} \equiv \text{Linear or Rotational-motion} \]
\[ T_K = T(q_1, q_2, ..., q_N, \dot{q}_1, \dot{q}_2, ..., \dot{q}_N) \]
\[ q_i = \text{the generalized coordinates}, \]
\[ \dot{q}_i = \text{the generalized velocities} \cdot i = 1,2,...,N \]
\[ \theta = \text{The } r \rightarrow v \text{ angle on Orbit-Nucleus} \]

The Lagrangian of motion is \( (1) \) ↓ as
\[ L_a = \frac{1}{2} m \dot{r}^2 - V(r) = \frac{1}{2} m[\dot{r}^2 + \dot{\theta}^2] - V(r) \quad \text{....(1)} \]

since \( \dot{r} = \dot{r} + r \dot{\theta} \) and the coordinates of electron are given by the Polar-coordinates \( (r, \theta) \), and are respectively.

Equations of motion → \[ \frac{d}{dt} \left[ \frac{\partial L_a}{\partial \dot{r}} \right] - \frac{\partial L_a}{\partial r} = 0 \text{ and } \frac{d}{dt} \left[ \frac{\partial L_a}{\partial \dot{\theta}} \right] - \frac{\partial L_a}{\partial \theta} = 0 \quad \text{....(2)} \]

Angular momentum vector \( \mathbf{L} = r \mathbf{m} \mathbf{v} = m r \mathbf{r} \dot{\theta} = (mr^2) \dot{\theta} \) and \( r^2 \dot{\theta} = \frac{L}{m} \quad \text{....(2a)} \)

and from Kepler’s law of areas \( dA = \frac{1}{2} r r d\theta = \frac{1}{2} r^2 d\theta \), or \( dA/dt = \frac{1}{2} \frac{L}{m} \), or \( \frac{dA}{dt} = \frac{L}{2m} \) i.e. the area swept by the central radius \( r \), is → \( \frac{dA}{dt} = \frac{L}{2m} = \text{constant} \quad \text{....(3)} \)

Lagrange’s equation \( (2) \) for the \( r, \theta \), coordinates becomes,
\[ \frac{d}{dt} \left[ m \dot{r} \right] - \left[ m r \dot{\theta}^2 \right] + \frac{\partial V}{\partial r} = 0 \]

and integrating \[ \frac{1}{2} \frac{m \dot{r}^2}{2m} + \frac{1}{2} \frac{L^2}{m r^2} \] + \( V(r) = E \) ....(4)

where \( E \) is the energy in the motion in cave Atom, \( r \). Solving (4) to velocity then

Velocity \( \dot{r} = \sqrt{\frac{2}{m} \left[ E - V(r) - \frac{L^2}{2m r^2} \right]} = \sqrt{\frac{2}{m} \left[ E - \left( \frac{k}{r} + \frac{L^2}{2m r^2} \right) \right]} \quad \text{....(5)} \) i.e.

Electron’s Velocity \( \overrightarrow{v_e} = \dot{r} \), the motion, is depended on the Total Energy \( E \) of the cave, \( r \), the Orbit and of the Angular-Momentum Vector \( L \) of caves, which is equal to Spin, \( S \). Since Energy-Areas \( dA/dt \), are constant, consist The Potential-Energy in Capacitors.

2e. The Atoms Physical Properties:

1. Total Energy \( E = T_K + L \equiv \text{The constant of Integral.} \)
2. Spin \( \equiv \text{Torsional motion} \equiv L \equiv B \equiv \text{constant} \)
3. Potential Energy \( U = V(r) + \frac{L^2}{m r^2} = -\frac{k}{r} + \frac{L^2}{m r^2} \), where \( k \) = a constant, and then,

a… As \( r \rightarrow 0 \), then \( U = -\frac{k}{r} + \frac{L^2}{m r^2} = \frac{1}{r^2} \left[ \frac{L^2}{2m} - k r \right] \equiv \infty \rightarrow \text{Strong-Forces} \)
b… As \( r = \infty \), then \( U = -\frac{k}{r} + \frac{L^2}{m r^2} = \frac{1}{r^2} \left[ \frac{L^2}{2m} - k r \right] \equiv 0 \rightarrow \text{PNS-Field} \)
c… As \( r \rightarrow \infty \), then \( U = -\frac{k}{r} + \frac{L^2}{m r^2} = -\frac{1}{r^2} \left[ \frac{L^2}{2m} + k \right] \equiv < 0 \rightarrow \text{Black Hole} \)
d… As \( r \rightarrow \frac{L^2}{2km} \), then \( U = \frac{4k^2 m^2}{L^4} \left[ \frac{L^2}{2m} - \frac{L^2}{2m} \right] = 0 \rightarrow \text{Turning-Points} \)
e… As \( r \rightarrow \frac{L^2}{2km} \), then \( U = \frac{4k^2 m^2}{L^4} \left[ \frac{L^2}{2m} - \frac{L^2}{2m} \right] = 0 \rightarrow \text{Black-Hole} \) i.e.

For \( a \), The Potential-Energy becomes infinite (\( \infty \)), as \( r \rightarrow 0 \), as this happens in Focus where Protons are very close to Neutrons. These are the Nucleus Strong-forces.

For \( b \), The Potential-Energy becomes Zero (\( 0 \)) as \( r \rightarrow \infty \), as this happens in PNS - Energy-field where time \( T \), is not existing and Energy, \( E \), is Infinite.

For \( c \), The Potential-Energy becomes Negative (< \( 0 \)) as \( r = \infty \), for any \( L \) and \( r \).

Integrating (3) then, \( A = T L / 2m = 2a b \), where \( T \) the Period of Orbital rotation and
\[ b^2 = a^2 - (ae)^2 \] and from Kepler laws \[ \frac{T^2}{a^2} = \frac{4\pi^2 m}{2E} = \frac{4\pi^2 a^3}{GM} \] or \[ T^2 = \frac{4\pi^2 a^3}{GM} = \text{constant} \] \hspace{1cm} (6)

**Energy** \[ E = \frac{1}{2} m \mathbf{r}'^2 + \frac{L^2}{2m r^2} - \frac{GmM}{r} \equiv L = m r^2 \dot{\theta} \] \hspace{1cm} (7) and is the **Energy in Atom**

The **First-term** is the Kinetic-Energy of the Planet on Orbit, The **Second-term** is the Constant-Rotational-Energy OR the Spin of Atom, The **Third-term** is the Constant-Gravitational-Potential-Energy.

When velocity \( \mathbf{r}' \), of the First-term is zero, and this happens at the turning points then \[ \mathbf{U} = \frac{L^2}{2 m r^2} - \frac{GmM}{r} = 0 \] and \[ \frac{\partial U}{\partial r} = -\frac{k}{r} = f + \frac{L^2}{2 m r^3} = 0 \],
\[ \mathbf{U}'' = \frac{\partial^2 U}{\partial r^2} = -\frac{\partial f}{\partial r} + \frac{3L^2}{m r^4} > 0 \] \hspace{1cm} (8)
\[ \frac{\partial f}{\partial r} < \frac{3L^2}{m r^4} \] becomes according to position \( r \), \[ \frac{\partial f}{\partial r} < -\frac{3 f(r_0)}{r_0} \] \hspace{1cm} (8a)

### 3e. The Boundedness of Orbits

The general solution of (5) is \[ \frac{1}{r} = \frac{GmM}{L^2} + c_1 \cos \theta \] \hspace{1cm} (5a)
where \( c_1 \) is a constant and from Kepler’s relation \[ r = \frac{a(1-e^2)}{1+e \cos \theta} \] \hspace{1cm} (5b)

inversing then \[ \frac{1}{r} = \frac{1}{a(1-e^2)} + \frac{e \cos \theta}{a(1-e^2)} \] and compared to prior then \[ c_1 = \pm e \frac{GmM}{L^2} \] and \[ \frac{1}{r} = \frac{GmM}{L^2} \pm e \frac{GmM}{L^2} = \frac{GmM}{L^2} [ 1 \pm e ] \] \hspace{1cm} (9)

**Semimajor axis** \[ a = \frac{L^2}{G m^2 (1- e^2)} \equiv \frac{GM m}{2 E} \] \hspace{1cm} (9a)

**Total-Energy** \[ E = \frac{GmM^2}{2L^2} (e^2 - 1) \equiv \frac{GM m}{2 a} \] \hspace{1cm} (9b)

**Eccentricity** \[ e = \sqrt{1 + \frac{2EL^2}{G^2 m^2}} \] \hspace{1cm} (9c)

**Spin \( \vec{\Omega} \equiv \mathbf{L} \equiv \vec{\sqrt{(1-e^2)Gm^2}} \) \hspace{1cm} (9d)

**Energy in Orbit.** \[ E = -\frac{GM m}{2 r_p} (e - 1) \] and \[ \mathbf{L} = \sqrt{(1 + e)Gm^2} r_p \] \hspace{1cm} (10)

From Orbit-Geometry is \[ g f^2 a^3 = 1 \], \[ g f^2 \pi^3 = 1 \], and \[ E = h f \] \hspace{1cm} (11)

Using the known equations for Spin then Spin = \( \vec{\Omega} = (\pi r^4 \) \( \phi_n \) \( \phi_n \) = The Energy

in \( n \) wave-node loop where \[ f_n = \left[ n \frac{\sigma (1+\sqrt{5})}{4\pi r} \right] = \left[ 1+\sqrt{5} \right] \frac{\sigma}{4\pi r} = \frac{\Phi \sigma}{2\pi r} = \frac{\Phi}{h} \] \hspace{1cm} (12)
\[ \vec{\Omega} = \left[ \pi r^3 \sigma (1+\sqrt{5})/2 \right] \text{Total- Energy} 2\mathbf{L} = 2n(3+\sqrt{5}) \left[ \frac{\sigma^2}{\pi r^2} \right] \equiv \left[ \frac{n\sigma \Phi}{2\pi r^3} \right] \] \hspace{1cm} (13)

From relation \[ f_1 = \left[ \frac{1}{\pi r^4} \right] \vec{\Omega} \] and \[ \vec{\Omega} = \frac{\pi^3 \sigma (1+\sqrt{5})}{4} \] then \[ \vec{\Omega}^2 = \left[ \pi^2 r^4 \ f_1 \right]^2 \] \hspace{1cm} (14)

### 4e. The Euler-Analysis of Motion in Orbits

The Euler Vector equation of motion for a Rigid-Body is,

\[ J_1 \left[ \frac{d^2 \mathbf{K}}{dt^2} \right] + J_2 \left[ \mathbf{w}_3 \frac{dk}{dt} + \mathbf{S}_0.Q \right] = 0 \] \hspace{1cm} (15) where,

\[ J_1, J_2, J_3 \rightarrow \text{Are the Moments of Inertia of Ellipsoid related to Principal axis} \]
\[ \mathbf{w}_1, \mathbf{w}_2, \mathbf{w}_3 \rightarrow \text{Is the constant Angular-Velocity-Vector with respect to changes in} \]
\[ \mathbf{i}, \mathbf{j}, \mathbf{k} \rightarrow \text{The Unit constant-vector of the moving Body-System} \]
\[ \mathbf{i}, \mathbf{j}, \mathbf{k} \rightarrow \text{The Unit constant-vectors of Body-System} \]

Photon Particle, Photon Wave OR The Duality Photon ???
\[ \bar{s}_0, \bar{s} \rightarrow \text{The Unit motion vector on the common section of Planes} \quad i-j, i-k. \]

\[ \varphi, \theta, \psi \rightarrow \text{The Three axial angles of vectors} \quad \bar{\imath}, s^*_0 - \bar{\imath}, \bar{s}_0 - \bar{k} \bar{k} \]

\[ Q \rightarrow \text{The weight of the Rigid-Body} = m \; g. \]

\( \frac{d\varphi}{dt}, \frac{d\theta}{dt}, \frac{d\psi}{dt} \rightarrow \text{The Angular-velocities of angles } \varphi, \theta, \psi \)

\[ \bar{B} \left[ B_1, B_2, B_3 \right] \equiv \bar{S} \left[ S_1, S_2, S_3 \right] \rightarrow \text{The Angular-Momentum-Vector } \equiv \text{Spin.} \]

Energy Relations:

\[ \bar{B} = J_1 w_1^2 \bar{\imath} + J_2 w_2^2 \bar{j} + J_3 w_3^2 \bar{k} \quad \text{.............. (16)} \]

\[ B^2 = J_1^2 w_1^2 + J_2^2 w_2^2 + J_3^2 w_3^2 \quad \text{.............. (16a)} \]

\[ \bar{B} w = Jw^2 \left( = 2L \right) = J_1^2 w_1^2 + J_2^2 w_2^2 + J_3^2 w_3^2 \rightarrow \text{Ellipsoid of Angular-velocity} \]

\[ L = \frac{B_1^2}{2I_1} + \frac{B_2^2}{2I_2} + \frac{B_3^2}{2I_3} = \text{The Constant-Angular-velocity-momentum-Ellipsoid} \text{ ....(17)} \]

I.e. \( \rightarrow \) For any radius \( OP \) of \( \bar{w} \)-vector exists another radius of \( \bar{B} \)-vector \( \text{Perpendicular to} \), \( \text{The} \; \bar{w} \)-edge \( \text{Tangential-Plane of the Angular-Vector-Ellipsoid} \), and \( \text{The} \; \bar{w} \)-vector \( \text{is Perpendicular to the} \; \bar{B} \)-edge \( \text{Tangential-Plane of the Angular-Momentum-Vector} \) \( \text{Ellipsoid. In case of Zero-Moment, related to the equilibrium Point} \; O \), then,

**The motion of a Solid Body is Identical to the Rolling of the PO-\( \bar{w} \)-Vector -Ellipsoid**

\([\text{OP}] \) in \( E \)-Tangential to Ellipsoid \( \left[ \bar{B} = OT \perp E \right] \) Vector. \([70]\)

5e. : The Precession and Nutation of Electron :

Gravitational constant \( G \), \( \text{is The Pulling and Cohesive Force} \) on all the Quantized Energy-Structures which communicates with everything due to \textit{Periodic excitation} on all Spaces. Newton’s laws issues for masses and the same to Electrons in caves as below,

\[ G \equiv g, k_0 \equiv g \left[ g_0, k_0 \right] \equiv \left[ \frac{T_p}{a^3} \right], \left[ g_0, k_0 \right] \equiv 9,8078925 \times 6,81116.10^{-12} \equiv 6,68056.10^{-11} m^3 \text{Ns}^{-2} \]

Electron being in Hydrogen-cave \textit{Precesses because of the different axis of rotation} and \textit{Nutation’s , from the immense-communication to gravity} \( \bar{g} \).

Electron-Spin is the Angular-momentum-vector \( \bar{B} \) and rotates according to \( \text{equation } \frac{d\bar{B}}{dt} = \left[ u\bar{B} \right] = uB \left[ \bar{k} \right] \) \( \text{in Gravitational Potential} \; U_g = \left[ \text{mg} \right].\text{cos} \; \theta = - sQ \left[ \bar{k} \right] \), so the change of \( \bar{B} \) is \( \rightarrow \frac{d\bar{B}}{dt} = u = \frac{sQ}{B} \left[ \frac{\bar{B}}{j_3 w_3} \right] \)

and from 1-degree equation of motion \( u, \dot{u} + w^2 u = 0 \), then

**Period of Nutation** \( T = \frac{2\pi}{u} = \frac{2\pi j_3 w}{sQ} \), \( \text{and N-Frequency} \; f_N = \frac{sQ}{2\pi j_3 w} \quad \text{..........(1)} \)

With Total Energy of Nutation \([70]\), \( E_N = \frac{j_3}{2} \left[ w_1^2 + w_2^2 \right] + \frac{j_3}{2} w_3^2 \quad \text{..........(2)} \)

For Material-Point, the chains of Spins due to Periodic excitation \( \left[ \leftrightarrow \right] \) is created in \textit{Orbit a Magnetic field} due to LRC-circuit and which is tuning to the critical Quantum critical-State \( g_c \). The \textit{Light velocity vector} \( \bar{v} = \bar{c} \), by \textit{Acting on cave}, \( r = L_P \), finds the \textit{Impedance} \( m_g \), \textit{Becomes the Centrifugal-Force} \( F_g \) of Cave Equal to \textit{Gravity} \( g \). The \textit{chains of Spins} for the, ONE-WAY Pointy vibrating, is the Resonance Frequency \( f_R = \left( \frac{1 + \sqrt{5}}{4\pi} \right) \sigma \left( \text{of} \; \bar{c} \; \text{and} \; \bar{B} \right) \text{of The-Stationary-Photon-cave} \), where \( \bar{B} = \bar{S} \equiv \text{Spin} \).

The Moving Electron in Orbit of charge \( \bar{q} = \ominus \) with the \textit{Orbit-Velocity-Vector} \( \bar{v} \) is

\[ \bar{v} = \sqrt{\frac{2}{m} \left[ E - \left( \frac{k}{r} + \frac{L^2}{2m r^2} \right) \right]} , \text{ Creates IN Orbit} \; r, \text{ the Varying and Perpendicular} \]
Magnetic-Field, \( \vec{B} \), which in time-turn Creates an Electric-field \( \vec{E} \perp \vec{B} \), with resultant force \( \vec{F} \) acting on Electron, Velocity \( \vec{v} \) is composed of \( \vec{V_p} \), Perpendicular to the Magnetic-circles \( \Omega \perp \vec{B} \), and \( \vec{V_e} \), Parallel to the Magnetic-field-Vector \( [\vec{B}] \), tending such that \( L \equiv S \equiv \text{Spin} \). The resulting motion of Electron is the Helical motion. Since Work is Produced during motion, The Conservation exist in Orbit \( [p \leftrightarrow e] \), so the Orbit occupies Energy as frequency quite differing that of those of Energy-levels.

Since frequency \( f_N = f_R = 2,8398447 \times 10^{10} \text{ s}^{-1} \{C-5\} \) and exists in all Atoms, due to the Hydrogen first cave, then is the Resonance-frequency between all Atoms and Molecules.

Energy from equation \( E = h f_N = 6.62607 \times 10^{-34} \cdot 2.8398447 \times 10^{10} = 18,817009. \times 10^{-24} \text{ J} \).

For Half-frequency \( f_q = 6.62607 \times 10^{-34} \) and Potential-Energy is \( U = E = h f = 6.62606957 \times 10^{-34} \cdot 1.4199223.10^{10} \), which agree with Bohr-Magneton.

The Produced-Work in Orbit as Frequency \( f_N = \frac{sQ}{2\pi f_w} = 2,8398447 \times 10^{10} \text{ s}^{-1} \)

Constant and is Conserved. Because of the Magnetic-field created On-Orbit, and Applied At - Nucleus with the same Effect then, exists LARMOR - Equation as \( w_0 = \gamma \cdot \beta_0 / 2\pi \), and for Hydrogen at 1.5 T Magnet, \( \gamma = 2,675. \times 10^8 / sT \), \( \beta_0 = 1.5 \) then \( w = 63,864 \text{ MHz} = 63,864.10^8 \text{ Hz} \) and frequency \( f_N = 2\pi w = 4.012575.10^{10} \text{ s}^{-1} \).

Remarks:

1. Since the frequency created from Electron-Nutation is the Basic, first, Orbit of Atoms, therefore allows a Resonance-frequency between all Atoms, Molecules and others.
2. Since Electron is continually-oscillating with the Nutation-frequency \( f_N \), so Produces an oscillating magnetic field which in turn is the source of an oscillating field, which implies the Regeneration each other, i.e. a Propagating Electromagnetic-Wave where \( E = B_c \).
3. Since Resonance-frequency is IN the first Orbit of Atoms, therefore allows Electromagnetic Wave, to get out the Atoms-cave, with a quantum-Energy \( E = h f_N \) or \( E = 2\mu B \).
4. Since Electron is rotating in Orbits so Electromagnetic Wave is also rotating, therefore is needed a Proper-Stationary-Magnet on which Rotation becomes Oscillation in order to succeed a clear 3-dimensioned, \( \Phi^3 \), Magnetic-Resonance-Imaging [The MRI] and other Systems using this Property of Bottom-Information. This Property of Spin in all depths of Energy-caves allows the Granularity of Energy in Energy-loops, and after to be Bonds.

6c. The Spin, and Magnetic-moment Relation-Analogous.

1. Magnetic Dipole - moment (\( \vec{\mu} \), or the Torque on a current loop, is a vector - quantity arising from the rotation of a current (\( I \)) in a circular loop of radius, \( r \), and area \( A = \pi r^2 \).
2. Angular-momentum-Vector becomes from the Eternal-Rotation of the \( \ominus \) constituent
The specific rotational velocity \( v = \omega r = |\omega| \cdot r = \frac{\sigma}{2r} \sqrt{1 + \sqrt{5}} \cdot r = \frac{\sigma}{2} \sqrt{1 + \sqrt{5}} = \sigma \Phi \), is related

The Spins, so Complex structure would have a Spin of \(-\frac{1}{2}, 1, \frac{1}{2}, \frac{1}{2}, -\frac{1}{2}\), or \(-\frac{1}{2}, -\frac{1}{2}, -\frac{1}{2}, -\frac{1}{2}\) only.

The specific rotational velocity \( v = w r = |w| r = \frac{\sigma}{2r} \sqrt{1 + \sqrt{5}} \cdot r = \frac{\sigma}{2} \sqrt{1 + \sqrt{5}} = \sigma \Phi \), is related
to Glue-bond, $\sigma$, only, meaning the **Granularity of Spin in all depths of Energy-caves**.

The nature of, + Spin, is exactly the same to, - Spin, because is the Angular-momentum Vector $\vec{B}$ of opposite direction and has nothing to do with Spinors. [35-36]

Space is a Quaternion, having discrete quantized Energy boundaries those of the two, $(\Theta)$, $(\bar{\Theta})$, constituents eternally rolling on Great or Small circles and accordingly, Clockwise or Anticlockwise Originating the ± Spin or (+), (-) Spin and is the first Quantized – Energy – monad. Charge in Physics is the Physical properties of matter that **Causes** it to experience a **Force** when placed in an Electromagnetic field, In contrast to Material-Point, where Force, $\vec{F}$, is originated From the Glue-bond, ± $\sigma$, of any two Opposite-Constituents in Energy-caves. Since current, $I$, is the net outward current through a closed surface and, $\vec{q}$, is the Electric-Charge contained within the volume defined by the surface, then Electric charge is equivalent to Magnetic moment, or $\vec{q} \equiv \vec{p}$, and current equivalent to angular velocity, or $I \equiv \vec{w}$. **Mass in Physics** is a property of a Physical-Body, and it is a measure of an object’s resistance to the acceleration, a change in its state of motion when a net force is applied, while in Material-Point, from its **Angular acceleration**, $\alpha = \frac{\vec{B} \times \vec{w}}{J}$, where

\[
J = \frac{\pi r^4}{2} = \text{The Polar moment of inertia and from Newton equation } 2E = m\alpha \text{ then, } m = \frac{2E}{\alpha} = \frac{2\pi}{\alpha} \cdot J
\]

is the reaction to Angular-velocity-changes in direction, a Scalar magnitude, and since Inertial mass is equal to Gravitational mass then, Mass of Material - point equals to, $m = \frac{2E}{\alpha} = \frac{\pi r^4}{2}$. $J \equiv \text{ a number measuring Energy-quantities in caves}$.

For an inclination of 45° then the Dot Product of $\vec{B} \cdot \vec{w}$ is $\vec{B} . [\vec{w}] = |\vec{B}| \cdot |\vec{w}| \cdot \cos 45^\circ$ and the Cross Product of $\vec{B} \times \vec{w}$ is $\vec{B} \times |\vec{w}| = |\vec{B}| \cdot |\vec{w}| \cdot \sin 45^\circ$ equal to Dot Product, and

In Planck’s – length - cave $r = 4,453.10^{-35}$ then mass becomes $m = \frac{1}{r} \cdot J = \frac{\pi r^4}{2} = 617,63.10^{-140} = 6,1763.10^{-138} \text{ Kg}$, and

The Ellipsoid of Angular-velocity remaining

\[
\frac{\omega_1^2}{2} + \frac{\omega_2^2}{2} + \frac{\omega_3^2}{1} = \frac{2E}{J}
\]

Since also $w = \frac{v}{r}$, and since in small circles the radius $R < r$, the radius of the Great circles, then, Angular velocity vector and frequency increases while Period, $T$, decreases.

This Precession in Material-Point is the analogous to Nutation of Earth and other Planets indicating the relation of Microcosm and the Macrocosm to the same laws of Mechanics.

From equation $\vec{B} = r \cdot m \cdot v = m \cdot r \cdot w = m \cdot w \cdot r^2$, **mass** $m = \frac{\vec{B}}{\omega r^2} = \frac{2B}{\alpha r (1 + \sqrt{5})} = \left[ \frac{1}{2\pi r} \right] \frac{\vec{B}}{r} = \frac{1}{w} \frac{\vec{B}}{r}$

\[= \frac{2E}{r} \text{ or } m = \frac{2E}{r}, \text{ and } E = \frac{B}{2c} \ldots [m] \text{ denoting the Unification of Energy Mass and Cave}.\]

[m] is The mass of Material-Point related to Any cave, $r$, and ± $\sigma$ its Principal Stresses. All Energy-levels follow the Space-Grainy-relation $f^2 \cdot a^3 = k = \text{Quantum-of-motion}$.  

Photon Particle, Photon Wave OR The Duality Photon ???.
Applying above to Under Planck’s length (that what prior called Virtual Particle or Fields of Antiparticle pairs); \{ The Spin ≡ the Angular-Momentum-Vector \( \vec{B} \), in the Self rotating Material point \([ +s^2 \leftrightarrow -s^2 ]\) \} → explains the Why Galaxies, and the clusters of Galaxies remain stable. In Caves of \((\Theta \equiv +s^2), (\Xi \equiv -s^2)\), Emerge-Spin as the Automobile - Force is Vacuum-Energy which was Prior analyzed. The Gravity-length-cave \( r = 3.969.10^{-62} \) and mass becomes → \( m = \frac{1}{1} J = \frac{\pi r^4}{2} = 389.80218.10^{-248} = 3.898.10^{-246} \) Kg.

7e. The Atoms Precession:

**Figure – 7 - : The Electron’s Nutation in Precession:**

In (1) The Electron-motion creates a Magnetic-Field \( \vec{B} \), in which is Stored Work. {Velocity vector \( V_e \) is composed of the \( V_{-V} \) Perpendicular constituent which stores motion in circular-Helix-paths and the Parallel constituent \( V_{-P} \) constituent which is Pushing the Energy-circles along a straight line}.

In (2) The Angular Momentum-Vector \( \vec{B} \), and the Angular-Velocity-Vectors \( \vec{w} \), of Electron at Point P and Proton at Point O, are Perpendicular each other and forming the Herpolhode, \( OPT \perp OB \), where Polhode, \( PS \perp OP \), perpendicular to Ellipsoid.

In (3) The Change of Angular Momentum-vector \( \vec{B} \), is Due to the change of \( \theta \), angle Nutation, and The Produced Work is Stored in the Nucleus-Electron-Orbit-Slim. Electron Precession is the (change of \( \phi \)) of Angular velocity while Electron-Nutation is the (change of angle \( \theta \)).

Precession is the change in \( \phi \), while Nutation is the change in \( \theta \). For \( w_3 = \text{constant} \) then \( \frac{d\phi}{dt} = \frac{d\psi}{dt} \) = constant and angular velocity \( w = \vec{k} \frac{d\phi}{dt} + \vec{k} \frac{d\psi}{dt} \) in the \( \vec{k} \ \vec{k}' \) Plane.

After some operations results the equation of motion under above restrictions as,

\[
J_3 \cdot w^2 \cdot \cos \theta - J_3 \cdot w_3 \cdot u + s \cdot Q = 0 \quad \text{.... (1)}
\]

with solution \( u = \frac{J_3 \cdot w_3}{2J_1 \cos \theta} \pm \sqrt{\left(\frac{J_3 \cdot w_3}{2J_1 \cos \theta}\right)^2 - \frac{sQ}{J_1 \cos \theta}} \quad \text{.... (2)} \) Displacement, \( u \), is called \( \rightarrow \) The Regular Precession of the Rigid-Body \( \leftarrow \)

The under root terms are \( > 0 \) when \( \frac{sQ}{J_1 \cos \theta} \) is very small or when Angular velocity \( w \cong w_3 \) where then, angular velocity axis is very closed to the Principal Ellipsoid axis.
The change of Angular-momentum is 
\[ \mathbf{d} \mathbf{B} = \mathbf{M}. \mathbf{dt} = \mathbf{[sQ, Q]} \mathbf{dt} = s \mathbf{Q} \cdot [\vec{k} \vec{k}] \mathbf{dt} \] 

\[ \ldots \ldots (3) \]

where Kinetic energy during a displacement 2s, is not changing, while Angular-velocity vector \( \vec{\omega} \), is placed around \( \vec{B} \), for which Moment of Inertia Ellipsoid executes a circular Polhode. The moving Inertia is rolling on the steady cone, driving in Precession the Electron-Spin-axis. Since vectors \( \mathbf{B}, \vec{\omega} \), are very closed each other and to symmetric axis \( \vec{k} \). Polhode are narrow closed loop-curves on Poisson-Plane around \( \vec{B} \) vector.

The Angular-momentum-vector \( \vec{B} \) rotates according to equation \[ \frac{dB}{dt} = [\vec{u}, \vec{B}] = u \mathbf{B} \cdot [\vec{k} \vec{k}] \] in Gravitational Potential \( U_\mathbf{g} = [\mathbf{mg}, \cos \theta] = -sQ \cdot [\vec{k} \vec{k}] \), so the change of \( \vec{B} \) is 
\[ \frac{dB}{dt} = u = \frac{sQ}{B} = \frac{sQ}{1/2}\mathbf{w}_3 \] and from 1-degree equation of motion, \( \mathbf{u} + \mathbf{w}_2 \mathbf{u} = \mathbf{0} \), then

**Period of Nutation** 
\[ T = \frac{2\pi}{u} = \frac{2\pi}{sQ/2\mathbf{J}_3\mathbf{w}_3} \], and **Frequency** 
\[ f_N = \frac{sQ}{2\pi\mathbf{J}_3\mathbf{w}_3} \] \[ \ldots \ldots (4) \]

With Total Energy of Nutation 
\[ E_N = \frac{J_1}{2} \left[ w_1^2 + w_2^2 \right] + \frac{J_2}{2} \mathbf{w}_3^2 \] or in Euler angles 
\[ E_N = \frac{J_1}{2} \left[ \theta^2 + \phi^2 \sin^2 \theta \right] + \frac{J_2}{2} \left[ \psi \phi \cos \theta \right]^2 \] \[ \ldots \ldots (5) \]

**An Example**:

For Electron radius \( s = r_e = 5, 82.10^{-16} \) m,

Weight of Electron \( Q = m_e \mathbf{g} = 9.11.10^{-31} \cdot 9.808 = 8,93.10^{-30} \) Kg,

Moment of Inertia-Disk \( J_e = J_3 = \pi [\mathbf{a}^2/2] = \pi/2 [5.8 \cdot 10^{-16}] = 1,777591.10^{-61} \) m²,

Angular velocity \( w_e = \frac{v}{f_N} = \frac{c}{1836} = \frac{3.10^8}{1836} = 1,633.10^5 \) m/s because of masses analogy

**The-Electron-Nutation-frequency** 
\[ f_N = \frac{sQ}{2\pi\mathbf{J}_3\mathbf{w}_3} = \frac{5,82.10^{-16} \cdot 8,93.10^{-30}}{2\pi \cdot 1,777591.10^{-61} \cdot 1,633.10^5} = \] 
\[ f_N = f_R = \frac{2,8398447.10^{10}}{s^{-1}} \] \[ \ldots \ldots (6) \]

From equation (5) is seen, The **moving Electron** [\( \Theta \) charge] creates a Magnetic-field which **Changes** from Total-Kinetic-energy \( E = T_K + L \), where \( L = S = \text{Spin} \).

What this means? \( \rightarrow \) **Work is continually created as Resonance-Frequency** \( f_R = f_N \)

Since in Universe exist only **Motion**, and Work \( \equiv \text{Energy} \equiv \text{Force \times Displacement} \), therefore the continually-Moving Electron **Carries this** \( \rightarrow \) [Motion-Box]. How ???

To exist Work \( \equiv \text{Energy} \) are needed Two things, The **One is the Force to be confined** in a [ **Motion-Box** ] and the Second is the **Force which is Pushing this** [ **Motion-Box with the confined motion** ] . In Photon are the \( n \), frequencies .

The moving Electron-vector is \( \vec{V}_e = \vec{V}_{ef} + \vec{V}_{e\rightarrow} + \), and is composed of Two-velocity components, the one is the Perpendicular \( \uparrow \) and the other is the Parallel \( \rightarrow \), to **Motion Box**, where the **First CARRIES Motion Into the** [ **Motion-Box** ], and the Second **PUSHES** the **Motion-Box**, Figure -8- as

1. The [Motion Box] which carries, This Motion \( \mathbf{v} \approx \mathbf{r} \), are The **Magnetic-field-lines** which are circles in field, filled with motion \( \equiv \) transportation \( \equiv \) Spinning.

   The velocity-component, \( \vec{V}_{ef} \), being Perpendicular to the Magnetic-lines creates Energy-Circles and thus, Motion \( \equiv \text{Energy} \), is Carried in this **Magnet-Box**.

2. The **Pushing velocity-Force** on this [ **Magnet-Box** ] \( \equiv \) The **Velocity-Vector-Force** which is Perpendicular to the Magnetic-field-lines **Plane**, and which carries the [**Magnet-Box**] along a straight line with horizontal distance, the pitches, between Two consecutive circles. The Resulting motion is the Helical and thus Energy is Propagated. The difference between the Potential-Energy of the Orbit and that of

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Photon Particle, Photon Wave OR The Duality Photon ????
Electron-Nutation in Precession with the **Lowest-Potential-Energy**, is the Resonance Frequency \( \equiv \) Energy. The analogous is in Electrical Circuits where, when a circuit is Driven to Oscillate at its natural frequency \( f_N \), either by storing in it Electrical Energy, or by Charging its Capacitor, Figure -9. In Fig-8 is shown the Electromagnetic-Wave Propagation.

The [Magnetic-Fields] \( \equiv [\) Energy-Baskets] is the Way for Energy-Propagation as,

Strength-field \( \vec{B}_F = \frac{2\pi m r}{q_T} \), \( f \equiv \vec{B} = \frac{\pi r^2 \phi \sigma}{\lambda} \rightarrow \) Wave \( \equiv \{[\varepsilon E^2 + \mu B^2] = 2.\lambda c. \sin \left[ \frac{2\pi r}{\lambda} \right] \}, \)
\( \vec{w} = 2\pi f = \frac{2\pi}{m} \), issuing that Tangent of Ellipsoid \( \rightarrow \vec{B} \perp \vec{w} \) Vector \( \leftarrow \) and Tangent of Ellipsoid \( \rightarrow \vec{w} \perp \vec{B} \) Vector. It is a relation between Angular and Momentum Ellipsoid.

![Image](image.png)

**Figure -8**: The How moving-Electrons create Electromagnetic-Wave and Propagate.

In (1), The Moving Electron of charge \( \vec{q} \equiv \odot \) mass \( m \), with the Orbit-Velocity-Vector \( \vec{v} \),

\[ \vec{v} = \sqrt{\frac{2}{m} \left[ E - \left\{ \frac{k}{r} + \frac{L^2}{2mr^2} \right\} \right]} \], \text{ Creates IN Orbit} \( r \), the Varying Perpendicular Magnetic-Field, \( \vec{B} \), which in time-turn \text{ Creates} an Electric-field, \( \vec{E} \), Perpendicular to \( \vec{B} \), with resultant force \( \vec{F} \), acting on Electron.

Velocity \( \vec{v} \) is composed of \( \vec{V_p} \), Perpendicular to the Magnetic-circles \( O \perp B \), and \( \vec{V_v} \), Parallel to the Magnetic-field-Vector B tending to \( L \equiv S \equiv \text{Spin} \).

The resulting motion of Electron is the Helical-motion.

In (2), The changing Electron-velocity-Vector, \( \vec{v} = \sqrt{\frac{2}{m} \left[ E - \left\{ \frac{k}{r} + \frac{L^2}{2mr^2} \right\} \right]} \), \text{ Creates} the Perpendicular Magnetic-Field \( \vec{B} \), which Magnetic-lines are the Energy circles \( O \) in \( B \), Due to the velocity-constituent \( \vec{V_p} \), which is Perpendicular to Magnetic lines \( O \).

The velocity - constituent \( \vec{V_v} \) is Perpendicular to the, Plane of Circles - \( O \), and Pushes O-Plane along a straight line forming thus, the Helical motion of Electron. Because of the Orbit- Magnetic-Field \( \vec{B} \), Property answers the Zeeman effect.

In (3), The Moving Electron of charge \( \vec{q} \equiv \odot \), with the Orbit-Velocity-Vector \( \vec{v} \), as

\[ \vec{v} = \sqrt{\frac{2}{m} \left[ E - \left\{ \frac{k}{r} + \frac{L^2}{2mr^2} \right\} \right]} \], is forming angle \( < \theta \) with \( \vec{B} \) Vector, Creates IN ORBIT \( r \), the Perpendicular Magnetic-Field \( \vec{B} \), which Magnetic-lines are the Energy circles \( O \) in \( B \), Due to the velocity-constituent \( \vec{V_p} \), Perpendicular to Magnetic-circles \( O \).

The velocity - constituent \( \vec{V_v} \) is Perpendicular to the, Plane of Magnetic - Circles - \( O \), and Pushes the O-Plane along a straight line i.e. Magnetic-Field is the Store of Energy.
The continuous change of direction of the Electron **Orbit-Velocity-Vector** \( \vec{v} \), related to \( L = S \equiv \text{Spin} \), creates the Base of Propagation of it in Hydrogen-Orbit by using the Electromagnetic-Wave \( E, B \), as an Energy-Transported-Box. Because during motion is **Produced-Work**, which is **Conserved in Orbit** so, Orbit occupies Energy as frequency differing that of Energy-levels. i.e. Energy \( \equiv \) motion Propagates, **travels**, as **Magnetic - Field** \( \vec{B} \) which is the Box, and as **Electric-Field** \( \vec{E} \) which is The **Thrust** of the Box.

Since this frequency \( f_N = f_R = 2,8398447.10^{10} \text{ s}^{-1} \) exists in all Atoms, it is The **Resonance - frequency** between All Atoms and Molecules in this Cosmos.

For Half-frequency \( f_R / 2 = 1,4199223.10^{10} \text{ s}^{-1} \), then Kinetic Energy is zero and Potential-Energy is, \( U = E = h \cdot f = 6,62606957.10^{-34} \cdot 1,4199223.10^{10} = 9,4.10^{-24} \text{ J} \)
\( = 5,8722.10^{10} \text{ eV} \), which agrees with Bohr-Magneton.

Because the Magnetic-field is created On-Orbit and Applied At-Nucleus with the same Effect then, exists LARMOR - Equation as, \( \omega_0 = \gamma \cdot \beta_0 / 2\pi \), and for the Hydrogen at 1.5 T Magnet, \( \gamma = 2,675. 10^6 / \text{s T} \), \( \beta_0 = 1,5 \text{ T} \), then \( \omega_0 = 63,864 \text{ MHz} = 63,864.10^9 \text{ Hz} \), frequency \( f_N = w/2\pi = 1,016457. 10^{10} \text{ s}^{-1} \) or is, The Communication-Tool, The **Identity-Card** between all Atoms relations.

From Orbit-equation, \( \vec{v} = \sqrt{\frac{2}{m} \left[ E - \left( \frac{k}{r} + \frac{s^2}{2m} \right) \right]} \) and for \( v = 0 \) then \( E = \left( \frac{k}{r} + \frac{s^2}{2m} \right) \) and for \( r_p = L^2 / [GM m^2] = S^2/m^2GM \) then \( E = \left( \frac{kGMm^2}{L^2} + \frac{s^2}{2m} \right) = \left[ \frac{kGMm^2}{S^2} + \frac{m|GM|m^2}{2S^2} \right] \), and Energy \( E = \left[ \frac{|GM|m^2}{S^2} \right], [2k+GM|m|] \equiv \frac{k_0}{2S^2} \equiv \text{Constant and Halve-Spin-Inverse-Squared} \), i.e. Energy \( \equiv \) motion, And transported in Caves as their Spin-Position, \( S \), which Thus, defines The Identity of Orbits in all Atoms and Molecules.

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**Figure - 9** - The Effect of Gravity ,\( g \), on Electron-mass **Originates Electron-Nutation** \( \theta \), in **Electron-Precession** , \( \varphi \), and changes **Electron-Spin-Direction** , \( \psi \). The **Produced-Energy** is stored in Magnetic field \( \vec{B}_p = 2\pi.m_p.f_r / \vec{d}_p \).

The Data In A - Cave -Site :

a). **Spin** is a **Couple of Forces** [ + F, - F ] following the Vectors Rules. Figure-11-
b). **Electron** [ of - Charge ] moving in Orbit around the Nucleus creates a **Magnetic Field** **tilted** to Electron’s-Spin [ \( M_0 = S_0 \) ], therefore it’s **tilted axis precesses**.

c). Nucleus-Spin-axis is tilted with Orbit’s-Spin-axis, but because the two free-Couple Vectors [\( M_N = S_N \) and \( M_0 = S_0 \)] may be resolved into component vectors and the

Photon Particle, Photon Wave, OR The Duality Photon ???
Remark: Its Energy and so produces a Signal and from the becoming from the Eternal
This Orbit Protons Absorb Energy from
When velocity \( v \), i.e. the Signal is the Increasing - Potential Energy in loop. The \( [m_N, m_e, \text{Current-loop}] \) consists the Energy-Bond between

Photon Particle, Photon Wave OR The Duality Photon ???
Atoms and is the Communication-tool, The Resonance Signal, in all Universe.

Energy equation is $\rightarrow E_{\text{loop}} = E_{\text{dipole}} + \vec{\mu} \cdot [\nabla x \vec{P}] \equiv E_{\text{dipole}} + \vec{B} \cdot [\nabla x \vec{P}] \ldots (e)$ in which case, Of An-External-Magnetic-Field, $P$, the Electron - Spin is swaying around the Magnetic-Vector and this Motion, the Nutation, is transferred to the Nucleus.

**The Produced-Work is The-Frequency** $f_N = \frac{qQ}{2\pi j^2 w} \equiv f_R = 2,8398447.10^{10} \text{ s}^{-1}$.

In MRI, this is the Transverse-Presession, where $B$-Vector creates an RF Signal from the Precessing Protons, and **Conserved Energy is the frequency** $f_N = f_R$.

Because of the Magnetic-field created On-Orbit and Applied-at-Nucleus with the same Effect then, exists Larmor Equation as, $\omega_0 = \gamma \cdot \beta_0 / 2\pi$, and for Hydrogen at 1.5 Tesla, $\gamma = 2,675.10^8 / \text{sT}, \beta_0 = 1.5 \text{ T}$, then an-frequency $w = 63,864 \text{ MHz} = 63,864.10^6 \text{ Hz}$, frequency $f_N = 2\pi w = 4,012575.10^{10} \text{ s}^{-1}$.

Remark – 2.

The Accumulation of Energy as (e) creates the [The-Proton–Electron-Vector-Bracket] which is the BONDING - FREQUENCY, $f_N = \frac{qQ}{2\pi j^2 w}$, and Happens in the Maximum Potential cave $E = -U(x)$, and which is needed for any **Two Atoms to Joint** and create the molecules. Resonance Phenomena in any Media (Mechanical, Electrical, Acoustic Magnetic) is that, for Response to be the maximum at a Specific-frequency $f_0$ and requires more Energy Input including that of frequency. Nucleus with Spin $S \neq 0$ can absorb and emit Electromagnetic Radiation and undergo, Resonance, when placed in a magnetic field. **This Uniform-Magnetic-field of Nucleus-Orbit [p ↔ e] already exists in Protons** which Eternally becomes from the Swinging of the Electron-Angular-velocity Cone, with Spin-Vector $\vec{S}$ in the axis of cone as Angular – Momentum - Vector, the Polhode, at a fixed Point of the Central-Cone-circle. Because of Gravity, $g$, SPIN $\vec{\psi}$, is under NUTATION $\vec{\Theta}$, and the Response is the PRECESSION $\vec{\Phi}$, or THE → ELECTRON-NUTATION $\leftrightarrow$ due to Gravity is applied for a short time in the Plane Perpendicular, $\perp$, to the variated Moment-Vector, $[\vec{R}] \equiv [M_T] = [M_N] + [M_O]$ and the Work produced is Conserved in $→$ Nucleus-Orbit [p ↔ e] $= \equiv \text{[Energy-Box]}$.

**The Angular-velocity-cone, $\vec{w}$, is Rolling with Spin-Vector $\vec{B}$ in the central cone.** The Difference Between the Potential-energy of the Orbit and that of the Electron-Nutation Precession with the lowest Potential energy, is the **Resonance – Frequency** $\equiv$ The Energy.

In figure 9, is shown the Magnetic-Dipole-moment of nucleus which is associated with the Orbital Angular Momentum $[\vec{B}]$, the Spin, resulting to the $[\vec{R}] \equiv [M_T] = [M_N] + [M_O]$.

When an External Static-Magnetic-field is present then → The Spectral-lines $\leftrightarrow$ Split into multiple-Closely-Spaced-lines, because of the Released-Energy in the Magnetic-Field. Due to the Duality-Photon as, $\vec{v} \cdot [\frac{\sigma}{2\pi r} + \frac{\sigma \Phi}{2\pi r}] \equiv \vec{v} \cdot [\vec{f}_n + f_n]$.

Above Zeeman-effect, In Astrophysics, is the trapping of Magnetic field $\vec{B}_C \equiv [\frac{2\pi m}{\beta T}]$, where frequencies are varied from Suns. In Lasers, the cooled-velocity-trapping which is related to the Frequencies, In Electric-Dipole Spin, is the controlling of the Magnetic moment $\mu = \vec{B}$ by flipping the orientation of the Magnetic - Moment.

As was calculated for the **Strength** of an Magnetic-field of 1 Tesla the Static-Moment $= 1,174462.10^{-4} = 11,74462.10^{-5} \text{ eV}$. In the Absence of Electrons, $[M_T] = [M_N] = \text{The Spin}$ exists only as Nucleus-Magnetic-Field $\vec{B}_L$. The Kinetic Rotational-Energy in a monad, is the Scalar Quantity $L = E$, while the Vectors of, Angular-Momentum $\vec{B} \equiv \vec{S}$, and that of Angular-Velocity $\vec{w}$, are related in monads as $\vec{B} \cdot \vec{w} = 2L = J \cdot w^2$ Analysis in [90].

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Figure -10- : The Material, LRC Circuit on Orbit, on Focus-Planet-Sector [F↔P] :

8c.. The Focus and the Signals in Orbits

In the Undamped Planck’s - Conservative - System, the Total-Energy in Hydrogen-cave is, \(-13.6 \text{ eV}\), corresponding to the Natural-frequency of the Primary-Particle with the less Negative-Charge-frequency, which is the Electron and which mass \(m_e\), and frequency \(f_e\) follow the minimum energy \(g\). Equations-equation of motion is \(\ddot{x} + \omega^2 x = 0\) with solution

\[4 \pi f^2 r^2 \cdot m_e = g,\]  

where The Reaction to the Change of motion, Electron mass \(m_e = \frac{g}{4 \pi f^2 e}\) and the Primary equation of Electron \(w^2 r = m_e = \pi g = \text{constant}\)

Hydrogen-cave is a Vacuum in where exist also the Lattice-Stationary-Spinning-Material Point, where Energy in Cave a, is equation \(E = \frac{k}{a} + \frac{L^2}{2m a^2}\) and Unit-energy \(k\) becomes from equation \(a^3 f^2 r = \frac{1}{2m a^2}\), and from velocity \(c = \omega f a\) is, \(f^2 a = \frac{c^2}{4 \pi^2}\) or \(k a = \frac{4 \pi^2}{a^2}\) and Resonance - Energy \(\rightarrow E = \frac{k a}{a} + \frac{L^2}{2m a^2} = \frac{1}{a^2} [\frac{4 \pi^2}{c^2} + \frac{S^2}{4}]\) ....(re)

A... The Gravity System, It is Another Infinite ± Equilibrium-Rotating vectors \(\vec{r}\), where for Stability \(\uparrow \vec{r} \downarrow \vec{r} = 0\), and which Gravity-System interacts with Hydrogen-Cave-System. The condition for Irrotational Energy is \(\nabla \times \vec{B} = \nabla \times \vec{S} = 0\), or \(\nabla \times \vec{B} = \nabla \vec{r} + 2 \pi m f \vec{a} = 0\), and \(\vec{r} = \pm 2 \pi m f \vec{a}\). Vector \(\vec{r}\), occupies Both directions for Rotational - equilibrium, i.e.

The vector \(\vec{r} = \pm \vec{B} \equiv \vec{S} = 2 \pi m f \vec{a}\), and \(f_n = \frac{B}{2 \pi m e} = \frac{E}{h}\), is the Stationary-Filling-Ocean of the Spinning-Gravity-Material Point, in the called Empty-Space, with frequency that of Material-Point \(f_n = n.f = \frac{E}{h} = \frac{n.\sqrt{V}}{2\pi r} = \frac{\sigma \Phi}{2\pi r \nu r}\), where \(\nu = \sigma \Phi\), and Spin \(\nu = \vec{B} = J w = \pi^2. r^4. f_n = e\)

B... The Hydrogen-Cave-System, From the Nucleus -Planet velocity equations \(K_e = \frac{mv^2}{2} = E - \left(\frac{k}{r} + \frac{L^2}{2m r^2}\right) = 0, 4 \pi f^2 e \cdot m_a = g\), and for \(E = \frac{\pi g r}{r} + \frac{L^2}{2(g^4/4\pi^2)} = \frac{\pi g r}{r}\). \([g^3 r + 2.S^2.\mathcal{F}] = 0\), then issues \(g^2 r + 2.S^2.\mathcal{F}\) = 0 or \(f^2 = \frac{g^2 r^2}{2L^2} = \frac{g^2 r^2}{2B^2(2\pi)^2} = \frac{g^2 r^2}{8B^2\pi^2 r^2}\), since \(2L = B w\), then the Cave-Resonance-frequency of Nucleus-Planet is \(\rightarrow f_n = \frac{\sigma \Phi}{2\pi r n} = \frac{r c^2 e}{8\pi^2 r c^2 \Phi^2}\) ......f(c) where \(r_c = \text{Nucleus} - \text{Planet-Segment}, \text{and} \ S_c = \text{the Spin of cave}, \text{consisting the Cave-System} \).

Communication between the two Systems happens with their Resonance-frequency, and when \(f_n = \frac{\sigma \Phi}{2\pi r n} = \frac{r c^2 e}{8\pi^2 r c^2 \Phi^2}\) as \(\sigma \Phi^4 = \frac{8\pi^2 S_c^2 c}{r_c} = \sigma \Phi^2. \frac{8\pi^2 S_c^2 c}{r_c} = \sigma \Phi^2. \frac{16\pi^4 f_n n}{\Phi^4}\). Rearranging, \(\sigma \Phi^4. S_c^2 c = \sigma \Phi^2. \frac{8\pi^2 S_c^2 c}{r_c} = \frac{2\pi^2 S_c^2 c}{\Phi^4} \frac{\Gamma_c}{B^2} = \frac{16\pi^4 f_n n}{\Phi^4}\), and Resonance
frequency \( f^6_{\text{Resonance}} = \frac{g^2}{2\pi^3r_c^6c^5} \) and \( f^3_{\text{Resonance}} = \frac{g}{2\sqrt{2}\pi r_c|\mathbf{B}|} \), or \( f^2_{\text{Resonance}} = \frac{g}{\sqrt{2\pi r_c^6c^3}|\mathbf{B}|} \) ...(f.r)

This Frequency-Path-way through the line-Series of the infinite Spins \( \mathbf{B} \), which Spins are Oriented and Reoriented Spins, from The Two -Types of Material-Points, shows the way that Planet \( \mathbf{P} \), and Nucleus \( \mathbf{N} \), are continually communicating each other.

The Kinetic-energy in Planck’s System for any two masses \( m_1, m_2 \) is as,

Total Kinetic Energy \( \rightarrow E = \frac{1}{2}m_1v_1^2 + \frac{1}{2}m_2v_2^2 \), and because \( v_1 = v_2 = v \), then

\[ E = \frac{v^2}{2}[m_1 + m_2] \]

and since \( m_1 = \frac{F}{g^1} \), \( m_2 = \frac{F}{g^2} \), \( v = \bar{r} \), and for Unit Work \( E = 1 \), becomes.

\[ E = \frac{v^2}{2}[m_1 + m_2] = \frac{1}{2} \left( \frac{F}{g^1} + \frac{F}{g^2} \right) = \frac{F^2}{2} \left[ \frac{g^1}{g^2} + \frac{g^2}{g^1} \right] = \frac{F^2}{2} \left[ \frac{g^1+g^2}{g^1g^2} \right] = \frac{F^2}{2} \left[ \frac{2g}{g} \right] = \frac{F^2}{2} = \frac{1}{1} \text{, i.e.} \]

Unit Work of force, \( F \), between Two masses of constant Distance \( r_c \) is Proportional to a Constant and Minimum Acceleration, \( g \), the Layer, Stress \( g \equiv 8076925 \), and is inverse square to the distance as \( F = \frac{g}{r_c^3} \). \( \ldots \) (r) \( \rightarrow \) is Newton’s and Coulomb Laws ←

Gravitational-Constant Force \( \equiv G \), is Spread -over a Minimum - Surface, the Layer or Conductor or , a-Surface, or The-Permissible-Path, in -where exists this Reaction and called the mass. The Surface-force, \( gG ≡ gG \), becoming from the inner acceleration \( f_0 \) of the Material-Points as Vector, \( \bar{r} = \pm \mathcal{B} \equiv \mathcal{S}n \), is acting on Spins \( \mathbf{B} \), and all the masses of the universe , or is Action of \( G \) → on \( g \) → on \( \mathcal{B} \) → on \( \mathcal{S} \) → on \( gG \), through \( f_{\text{Resonance}} \)

Since \( f_{\text{Resonance}} = \sigma \Phi^3 = G \), then \( \sigma = G \Phi^3 = \frac{G}{c^3} \), and \( \sigma^2 G = c^4 \), where \( \sigma \) is Stress \( \sigma_{\text{Resonance}} \) between all frequencies. Stress \( \sigma = \frac{2}{\sqrt{G}} \sqrt{(\frac{1}{2\pi} v \sqrt{m})} \) and for \( v = c \) then, \( \sigma = \frac{mc^3}{2} + \frac{k}{a} + \frac{L^2}{2ma^2} = hf_R \)

Hydrogen Diameter \( \frac{a_H}{2m} = \frac{3}{\sqrt{6}} \sqrt[3]{\frac{1}{k} \left( \frac{1}{g} f^2 \right)} = \frac{3}{\sqrt{6}} \sqrt[3]{\frac{h^2}{g E^2}} = \frac{3}{\sqrt{6}} \sqrt[3]{\frac{1662060967.10^{-34}}{808.1361,6021810.16^{-19}} + \frac{1}{2}} = 2,1145016 \cdot 10^{-11} \text{ m} \)

The constant Energy \( k \), in Orbit is \( k = \frac{L^2}{2ma} \) and depends on Total-mass-cave \( m = M_T \).

For Total mass \( M_T \) issues The Parallel Connections Resistors inverse law as in Electricity. The Parallel RLC Circuit, with Impedance \( \equiv \) Composite-Resistor of the R, L, C calculates the Impedance of the Parallel RLC circuit and the Current drawn from the Supply. The Complex

1.. Impedance is \( Z_T = \sqrt{R_T^2 + \left| L_T - C_T \right|^2} \), where \( (w_0)^2 = LC \)

2.. Total-Resistor \( R_T = \left[ \frac{1}{m_1} + \frac{1}{m_2} + \frac{1}{m_3} + \ldots + \frac{1}{m_n} \right] \). Total-Inductance \( L_T = \left[ \frac{1}{q_1} + \frac{1}{q_2} + \ldots + \frac{1}{q_n} \right] \). \( w_0 \)

3.. Total-Capacitance \( C_T = \frac{1}{c_T} = \left[ \frac{1}{n_1} + \frac{1}{n_2} + \ldots + \frac{1}{n_n} \right] \). \( w_0 \) and supply the Current \( I_s = \frac{V_s}{Z_T} \) and

4.. \( f_{\text{Resonance}} = \frac{1}{\sqrt{4\pi i m a^3}} \), with Impedance \( \equiv \) Resistor and \( w_0 = 1 \) System-Resistor unaffected.

F. THE NEW ATOMS STRUCTURE.

1f.. The Structure of Atoms in Planck-Cave \( L_p = e^{-(\frac{5m}{2})} \).
**NUTATION FROM GRAVITY \( f_n \) AT ELECTRON-PRECESSION IS TRANSFERED AT HYDROGEN-NUCLEUS AS \( m_n \)**

**Figure - 11 -** The Orbit-Electron-Spin is applied on the Nucleus-Proton-Spin:

Spin is a Free-Vector of Electron and can be applied at Any-Point with the same effect. Couple \( \equiv \) Moment \( M = Fxd \rightarrow \) Vector, and may be resolved into Component-vectors Electron-Nutation-Vector \( \mathbf{M}_0 \) is the Resolved Component-vector \( \mathbf{M}_N = \mathbf{M}_0 \) at Nucleus. Atom Structure is The Quantization - Process of frequency \( f_{ph} \) and Gravity \( g \), in Energy Hydrogen Cave. Atom Cave is a Potential of \( 13.60 \text{ eV} \) becoming from the Energy-Cave Kepler equation, \( a^3 f^2 g = 1 \), or \( a = \sqrt[3]{1/g} \frac{f^2}{2} = 2.1145016.10^{-11} \text{ m} \), in the Planck cave \( L_p \equiv e^{-\frac{5\pi^2}{2}} = \sqrt{3.\pi} \cdot 1, 616199.10^{-35} \text{ m} \). The why such, was prior referred in 6d.

The Quantization of Energy \( \equiv \) Angular-Momentum \( \equiv r m v \), which consists the three Elements \( r = \) The Planet-Focus line, \( m = \) The masses, \( v = \) The velocity of mass which follow Kepler-second-law where for radius \( r \), sweeps out Equal-Areas in equal times and consequently Energy-Quantization becomes from equation \( a^3 f_n^2 k = 1 \) where \( k = \left[ \frac{4\pi^2}{GM} \right] \).

The Unit-Work occurs in Hydrogen cave following Kepler-first law in Orbits, \( 4\pi^2 r^3 f_p^2 = k \), which \( k = \) The Quantized Work \( W = v^2 \left[ \frac{\hbar}{2\pi} \right] \) or Work \( k = 4\pi^2 r^3 f_p^2 \) and being equal to the Unit-prior and so \( k = 4\pi^2 r^3 f_p^2 = \frac{1}{r^3 r^3} \) which results to the Resonance frequency \( f_R \) as \( f_R = \sqrt[4]{\frac{1}{4\pi^2 r^3 r^3}} \) of cave \( r \), and from \( f_R \) the Resonance Step-cave \( \rightarrow a = \frac{3}{4\pi^2 r^3} r^3 r^3 \) \( (1) \)

Atom-Cave is a, Heap of Masses \( M_T, Protons Electrons and Neutrons \), and Charges \( Q_T, Protons and Electrons \), following the Lorentz force equation \( F = q \cdot [E + v \times B] \) where \( E = 0 \) and Force is \( F = q \cdot \vec{v} \times \vec{B} \). The Created Magnetic-Field \( \vec{B}_F = \frac{2\pi M_T}{Q_T} |f| \), where in it Energy \( \equiv \) motion is Quantized, i.e. Magnetic-Field \( \overline{B}_F \) is the Store of Energy in motion \( \ddot{x} + w^2 x = 0 \) The Resonance Energy \( E_R \), becomes from The Moving Electron in Orbit of charge \( \overline{q} \equiv \Theta \) with the Orbit-Velocity-Vector \( \vec{v} = \sqrt{-\frac{2}{m} \left[ E - \left( \frac{k}{r} + \frac{L^2}{2mr^2} \right) \right] = 0} \), and this because charge \( \overline{q} \) Creates IN Orbit, \( r \),the Varying and Perpendicular Magnetic-Field \( \overline{B}_F \), which in time-turn Creates the Electric-field \( \vec{E} \perp \vec{B} \), with resultant force \( \vec{F} \) acting on Electron. For \( c = 0 \) then

Photon Particle, Photon Wave \ OR The Duality Photon \ ???
In Orbit exists **Only-Potential-Energy** of Orbit, and \[ E = \frac{k}{a} + \frac{L^2}{2m a^2} , \] and using Kepler’s law for equal-areas \( k = \frac{L^2}{2m} \), and constant Planets relation \( T^2 = \frac{k}{a^3} = 2\pi^2 \times \frac{9}{5} \times 10^{-19} \text{(s}^2/\text{m}^3) \) in Planck’s length \( a = \frac{1}{\sqrt{\text{k.f}^2}} \) then \( k = 1/a^3.f^2 \), and **Energy** \( E = \frac{1}{a^3 f^2} \left[ \frac{1}{a} + \frac{L^2}{2m a^2} \right] \). **Planck’s length** \[ a = \frac{1}{\sqrt{\text{k.f}^2}}, \text{ or } E = \frac{1}{a^3} \left[ \frac{4\pi^2}{c^2} + \frac{L^2}{2m} \right], \] and **Stored in the Magnetic field** i.e. Exists only **Potential-energy** \( L \) and the **Orbit is that of Circle**.

and the Resonance-Energy \( E_R = \frac{1}{a} \left[ \frac{4\pi^2}{c^2} + L^2 \right] \) ….(2) and it is a **Signal**.

**2f.** The Elements in the Atom cave \( \rightarrow \{ \text{Masses} – \text{Charges} – \text{Caves} \} \)

a- **Proton** \( \oplus \rightarrow \text{mass} \; m_p = 1.672.10^{-27} \text{Kg} \rightarrow \text{Charge} \; C_p = 1.602.10^{-19} \text{C} \rightarrow d = 8.4.10^{-16} \text{m} \)

b- **Electron** \( \ominus \rightarrow \text{mass} \; m_e = 9.11.10^{-31} \text{Kg} \rightarrow \text{Charge} \; C_e = 1.602.10^{-19} \text{C} \rightarrow d = 5.0.10^{-17} \text{m} \)

c- **Neutron** \( \oplus \leftrightarrow \ominus \rightarrow \text{mass} \; m_n = 1.672.10^{-27} \text{Kg} \rightarrow \text{Charge} \; C_n = 0.0 \text{C} \rightarrow d = 1.7.10^{-15} \text{m} \)

d- **Newton’s law** for masses is \( \rightarrow \text{Force} \rightarrow F_N = G \frac{m_1 m_2}{r^2} \),
e- **Coulomb law** for Charges is \( \rightarrow \text{Force} \rightarrow F_c = \frac{q_1 q_2}{r^2} \),
f- **Kepler laws** for **Planets** and **Constant-Areas** is \( \; 4\pi^2.\text{m}.f^2 n = k \; \), \( k \; f^2 n \; a^3 = 1 \)

g- **Magnetic-fields laws** for **Charges** and **Periods** is \( \; T = \frac{2\pi m T}{q B_F} \), \( \frac{B_F}{q T} = \frac{2\pi m T}{q T} \)

h- The United **Newton-Coulomb Electro-Mechanical Equation**, \( q B_L = 2\pi m f \), and the

Resonance frequency \( f^4 = \frac{1}{4\pi^2 m a^3} \), or \( f^4 = \frac{1}{4\pi^2 m a^3} \) between Charges and masses.

The **Total-energy** for **Unit-mass** \( E_T = K_E + P_E \), is from equation \( \sqrt{\frac{2}{m} \left[ E - \left( \frac{k}{a} + \frac{L^2}{2m a^2} \right) \right]} = c \) where for \( \rightarrow K_E = 0, c = 0, E = \frac{m c^2}{2} + \left( \frac{k}{a} + \frac{L^2}{2m a^2} \right) \) energy becomes \( E = \frac{k}{a} + \frac{L^2}{2m a^2} \)

or, Above configuration of, masses \( m_L \), Charges \( q_L \) in a Hydrogen cave \( a \), Forms an Harmonic Oscillator with a Natural Frequency \( f_R \) with the less Damping-factor (1/m).

The **Quantum of a Magnetic -Field** \( B_F \) in a cave, \( a \), is the **Resonance - Magnetic Frequency** \( f_R \), depended on the **Stiffness** , the **Damping** 1/m, of the cave per unit Charge \( q \), as the **Electro-Mechanic-equation** \( \rightarrow q \; B_L = \frac{2\pi m L}{2} \; f_R \) where,

1. **Resistor** \( R \), in **Electric Circuit** corresponds the analogous **Mass** , \( m \), in **Mechanics**.

2. **Inductor** \( L \), in **Electric Circuit** corresponds the analogous **Energy** , \( f \), in **Masses**.

3. **Capacitor** \( C \), in **Electric Circuit** corresponds the analogous **Magnetic** , \( q \), in **Planes**.

4. **Voltage** \( V \), in **Electric Circuit** corresponds the analogous **Field-Strength**, \( B_F \), in **Fields**.

5. The Parallel **RLC-Electric-Circuits** Create a **Resonant Frequency** stored in Magnetic Field \( B_F \), while the Charged Electrons are stored as Energy in Static-Electric-Field. Above configuration of, **RLC-Electric-Circuits**, forms a Harmonic oscillator in the Magnetic-field \( B_F \) and the same for, **Masses**, **Charges**, **Caves** , as below,

Photons, Photon Particle, Photon Wave OR The Duality Photon ???
\[ \text{The Resonance} \quad \text{The Nucleus} \quad \text{or} \quad \text{The Nucleus} \quad 2 \ldots \]

\[ \text{since } 1 \text{Tesla} = \frac{\text{N.s}}{\text{C.m}} = \left[ 9,349,206,8 \right] \]

The frequency of the Closed-Nucleus-Orbit-System becomes from Kepler second Planetary law equation, \( 4 \pi^2 \) m \( f^2 \circ = k \), and constant law of Areas \( l = k \cdot f \cdot a^3 \). Their common \( k \), is Constant-Energy \( \rightarrow k = 4 \pi^2 \) m \( f \cdot a^3 \) or, \( f^4 = \frac{1}{4 \pi^2 m a^3} \) and \( f = \frac{4}{\sqrt{4 \pi^2 m a^3}} \)

With this way, \( \text{Impedance } \equiv \text{Resistor} \) and \( w_0 = 1 \), the Resistor in the System is unaffected by the frequencies of Inductive and Capacitive Reactance and the Total-Resistance becomes as the above \( m = M_T = 9,100084.10^{-31} \text{ Kg} \). The Resonance-Cave-frequency is as \( c \),

\[ f = \frac{4}{\sqrt{4 \pi^2 m a H}} = \frac{1}{\sqrt{4 \pi^9,100084.10^{-31}(2,114305161.10^{-11})}} \approx \frac{2,944,3961.10^{60}}{1,3099329.10^{15}} \text{H} \ldots (c) \]

Coulomb-law issues between Nucleus and orbit diameter Charges \( d = 10^{-10} \text{ m} \), while Newton’s-law issues for all masses between Nucleus and Nucleus-Orbit \( d = 10^{-14} \text{ m} \), and is Universal law such in microcosm or as in macrocosm, and this because of \( G \).

The System \( M_T = \text{masses} \), \( Q_T = \text{Charges} \) creates a constant Magnetic-field \( \vec{B}_F = \left[ \frac{2 \pi M_T}{Q_T} \right] \)

The Magnetic-field-Strength \( \vec{B}_F = \left[ \frac{2 \pi M_T}{Q_T} \right] \frac{f = 2 \pi, 9,100084.10^{-31}(1,3099329.10^{15})}{8,011.10^{-20}} \) (Kg/CS) = 9,349,2068.10^4 Tesla .....(d) i.e. \( \vec{B}_F = 93,492068 \text{ Kilo-Tesla} \rightarrow \text{the Strength of a Non - Magnetar Neutral star} \),

since 1Tesla = [N.s/C.m] = [N/Ampere.m] = [Kg/CS] = 10^4 Gauss = 10^-9 Mega-Tesla.

Resonance-Cave \( a = \frac{\sqrt{T^2}}{g} = \frac{3}{g} \sqrt{1/g f^2} = \frac{3}{g} \left[ 1,3099329.10^{15} \right]^2 = \frac{\sqrt{2,778,342.10^{33}}}{1,981,783.10^{-18}} \text{ m} \), and the Resonance - Energy \( E = \frac{1}{a_T} \left[ \frac{4 \pi^2}{c^2} \frac{L^2}{2m} \right] \), where \( L = \text{the Spin } S = 5,691,952.10^{-34} \text{ Kg/m/s} \), mass \( M_T = 9,100084.10^{-31} \text{ Kg} \) of System, \( c = 2,998.10^8 \text{ m/s} \). \( E = \left[ 2,546,1638.10^{22} \right] \times \left[ 4,392086.10^{-16} + 1,780111.10^{-37} \right] = 1,118,297.10^7 \text{ J} + 4,532,454.10^{-15} \text{ J} \) .....(e)

i.e. Energy in Electron-Orbit is 1,118,297.10^7 J, or 11,2 Million Joules,

2.….. Case –B. \( \rightarrow \) 1-Proton \([\oplus]\) = An Ion-nucleus : 

The Nucleus Total-Harmonic mass \( M_T \) is \( \rightarrow \frac{1}{M_T} = \frac{1}{m_P} + \frac{1}{m_n} + \frac{1}{10^{27}} = 1,67,10^{-27} \text{ Kg} \) or \( M_T = 1,67,10^{-27} \text{ Kg} / 1,66053886.10^{-27} \text{ amu} = 1 \text{ amu} \)

The Nucleus-Orbit Total-Charge \( Q_T \) is \( \rightarrow \frac{1}{Q_T} = \frac{1}{q_P} + \frac{1}{10^{19}} = \frac{1}{1,6022} \text{ and } Q_T=1,6022.10^{-19} \text{ C} \).

The Resonance-Cave-frequency is \( f = \frac{4}{\sqrt{4 \pi^2 m a H}} = 4 \left[ \frac{1}{4 \pi^2 \cdot 1,672 \cdot 10^{-27} \cdot 1,14305161.10^{-11}} \right] = 4,2,003,159.10^{60} = 1,189,766.10^{15} \text{ H} \ldots (1) \). The System \( M_T = \text{masses} \), \( Q_T = \text{Charges} \)

Photon Particle, Photon Wave OR The Duality Photon ???
creates a constant Magnetic-field \( \overline{B}_F = \frac{2\pi M_T}{QT} \) of Strength \( \overline{B}_F = \frac{2\pi M_T}{QT}f \) as ,

\[
\overline{B}_F = \frac{2\pi 1.672.10^{-27}[.32705.10^{14}]}{1.6022.10^{-19}} = 2,028782.
\]

\( \overline{B}_F = 4.1464883.10^7 \) Tesla → the Strength of a Non-magnetoneutron-Star .

Energy in an Proton-cave of Proton radius \( r_p = 8.42.10^{-16} \) m , follows Energy-equation

\[
E = \frac{1}{a^3} \left( \frac{4\pi^2}{c^2} \frac{L^2}{2m} \right), \text{ where } L = \text{ the Spin } S = 5.691952. 10^{-34} \{ \text{Kg/m/s} \}, \text{ c } = 2.998.10^8 \text{m/s}.
\]

mass \( M_F =1.67.10^{-27} \text{ Kg of System , and Energy is } E = [1.4105087.10^{30}] x[-]

\[
[4.392086.10^{-16} + 9.700946.10^{-41}] = 6.1950755.10^{14} J + 1.3682067.10^{-10} J
\]

For the Ion-Proton \( E = \frac{k}{a} + \frac{L^2}{2ma^2} = \frac{L}{2m} \frac{1}{a} + \frac{L^2}{2ma^2} = \frac{L}{2am} \{1+ \frac{L}{a}\} \) where \( a_p \) is Proton-cave

\( L \) is the Spin \( S \), and \( m \) is the mass of Nucleus . Placing above quantities then Energy is

\[
E = \frac{5.691952.10^{-34}}{2.1.67.10^{-27}} \left( \frac{1 + \frac{5.691952.10^{-34}}{8.4.10^{-16}}}{8.4.10^{-16}} \right) = 2.028782.10^{18} + 1.3747296. \text{10}^{-10} \text{ Joule}.
\]

i.e. Energy of Charge-Proton is 0, 203.10^9 J , or 0,203 Giga-Joules and , it is about equal to the Reduced Planck energy .

Remark : Cave is composed of One mass in its Proton-cave with an Magnetic-field Strength

\( \overline{B}_F = 4.1464883.10^7 \) Tesla = 41,464883Mega-Tesla , with a Frequency \( f_R = 6.32705.10^{14} \text{H}. \)

The fact that Atom's-nucleus occupies such Energy as that of Neutron stars , consists the Atom as the strongest massive element in nature . This quantity consists the minimum Quantum ofEnergy in this cave and can be said is the Quantum of Magnetic-Energy in Atom .

This case is very interesting because it is the Quanta of Electron in microcosm and macrocosm as the strongest massive element in nature . This quantity consists the minimum Quantum of Energy in this cave and can be said is the Quantum of Magnetic-Energy in Atom .

This case is very interesting because it is the Quanta of Electron in microcosm and macrocosm i.e. the Spin of Electron is squeezing in the direction of the field - Space . Since Energy is on Magnetic-moment axis and Spin Precesses , the highly magnetized vacuum must behave like a Prism that Polarizes the light , this happening because of the Two-Magnetic-fields in Atom . Birefringence also split X-ray Photons into two

3f.. The New Electromagnetic-Structure of Atom .

n... Case –N. → n-Proton \( [\oplus] \), n-Electron \( [\ominus] \) , n-Neutron \( [\oplus \cup \ominus] \) → \( [\oplus \leftrightarrow \ominus] \):

From a Set of infinite rest, or , moving Units choosing Two of them , is consisted , and is found , the Mendeleev Periodic table in Planck's level \( 10^{-35} \text{ m} \) ( this Property issues in all Geometrical caves and in a cave of , \( 10^{-62} \text{ m} \), which is the Gravity level in which Gravity - Field exists ) , and also all models of the atom as follows ,

a... In Set \( \downarrow \equiv{\text{Mould}} \equiv \text{Space} \equiv \text{Cave} \) → The minimum Number of Points in each Energy-Level is

1 for Material-Point , \( \rightarrow \) 1 Point. \( x_2 = 2 \) Elements,
2 for Line-sector , \( \rightarrow \) 2 Points \( x_2 = 4 \)
3 for Plane , \( \rightarrow \) 3 Points \( x_2 = 6 \)
4 for Volume , \( \rightarrow \) 4 Points \( x_2 = 8 \)
m for \( \text{m} \) , Spaces. \( \rightarrow \) m Points \( x_2 = 2m \)

b... Elements → The maximum number of Elements = Digits in Material - Point is , 2 ,
[1 Positive \( \oplus \) and 1 Negative \( \ominus \) ] consisting the → Unit-M-P \( \equiv \{ [\oplus \leftrightarrow \ominus], \oplus \cup \ominus \} \)
The possible Repetitive-Permutations for moulds and Elements are MouldElements = \( m^3 \), for every mould , so the Available -Extrema-Positions for each mould is \( 2m^2 \) and for ,

Point E-Elements , Material-Point , Permutations , \( m \)-Cave Shapes, are for ,

Photon Particle , Photon Wave OR The Duality Photon ???
<table>
<thead>
<tr>
<th>Dimension</th>
<th>Equation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Point</td>
<td>$m = 1$</td>
<td>$2$</td>
</tr>
<tr>
<td>Line-sector</td>
<td>$m = 2$</td>
<td>$8$  $\rightarrow$ $2 + 8$</td>
</tr>
<tr>
<td>Plane</td>
<td>$m = 3$</td>
<td>$18$ $\rightarrow$ $10 + 18$.</td>
</tr>
<tr>
<td>Volume</td>
<td>$m = 4$</td>
<td>$32$ $\rightarrow$ $28 + 32$.</td>
</tr>
<tr>
<td>$m$ - Space</td>
<td>$m = m$</td>
<td>$2x m^2$ $\rightarrow$ $2m^2 + 2(m-1)^2$</td>
</tr>
</tbody>
</table>

![Diagram](image_url)

**Figure-12:** The Analogous RLC-Electric-Circuit of Atom’s Structure and Mechanics:

**Figure-13:** The New Energy-Atom-Cave Pattern, In minimum Energy-Space, $p \leftrightarrow e$:

1. Hydrogen-Cave becomes from Gravity, $g$, entering the minimum cave $a$ of $g.a.f_p^2 = 1$ relation, with the minimum Energy $-13.6$ eV. The Presence of a Proton-Positive-Charge $\bar{q}_p \equiv \oplus$, creates in cave $a$ the Uniform-Magnetic-Field $\bar{B}_p$, [The-Material-Space] as equation $\bar{q}_p.\bar{B}_p = 2\pi.m_p.f_e$ which is the Storage of Energy in Hydrogen-Cave.

In this UMF, Charges $\bar{q}$, Orbiting in a Plane Normal to $\bar{B}_p$, their cyclotron-frequency $f_n$ is independent of the Particles-speed and radius allowing the acceleration of Charged Particles as the, Electrons $\rightarrow \bar{v}_e = 2\pi.r.f_e$ and, Photons $\rightarrow \{ \bar{c} \cdot \bar{f}_n^2 + \bar{c} \cdot f_n \}$. 

Photon Particle, Photon Wave OR The Duality Photon
2. The Presence of a **Negative-Electron-Charge** $\bar{q}_e \equiv \ominus$ in the Uniform-Magnetic-field $\overline{B}_p$ experiences a Force, *The-Lorentz-Force*, when entering the Magnetic-field and since it occupies the constant-energy, $\bar{q}_e = \frac{G}{c^2} = 1.59 \times 10^{-19}$ C, then follows a **Complete-circle**

**The-Material-Space is** $\overline{B}_p$, and defines the Number of the Material-Points in Spaces, as well as the Material-number Zero which is now included.

The presence of Photons with this Dual frequency [ $\vec{f}_n + \vec{c}_n$ ], Storage + Energy allows The **Work** = Energy produced by **Electrons**, be Stored in **Photons - Storages**.

3. The Heap of Masses $m = M_T$ follow Newton laws, Charges $[\oplus, \pm \overline{q}_p, \ominus]$ the Coulomb law, Zero-Electron Charge $[(\oplus \leftrightarrow \ominus) \equiv \pm 0$ the Material-Geometry-Rules, Arrangements **Positions**, $n$, the Material-Geometry Rules of Permutations as follows,

a. The **Three Elements** = Digits of Material-Geometry are $[\oplus, [\ominus \leftrightarrow \ominus], \ominus] \equiv [+,-]$

b. The **Permutation**, arrangement, of the Two-Elements is $P_2^1 = 2$, and these are two as $\rightarrow [\ominus, \ominus] \leftrightarrow [\ominus, \ominus].$ The number of **Permutation** with **Repetition** of the Two-Elements in $n = 2$ in the Sub-Spaces is $P^{Moulds}_{\text{Elements}} = \overline{R}_P^2 \equiv 2$, because the numbers in Material Geometry do Not begin with zero $[(\oplus \leftrightarrow \ominus)$, as this happens in Euclidean-Geometry.

c. The Material-Spaces for **1- Point** $\equiv 2$ Elements, **A Vector** $\equiv 4$ Elements, **A Plane** $\equiv 6$ Elements, **A Volume** $\equiv 8$ Elements, **A Space1-volume** $\equiv 10$ Elements, **A Space2-volume** $\equiv 12$ Elements, **A Space-n-volume** $\equiv 2 \cdot n$ Elements in Regular Solids, [63]

d. The number of **Permutation** with Repetition of the Two-Elements in the $n$-Spaces and in the Two **Sub-Spaces** is $P_2^2 \cdot \overline{R}_P^3 \equiv 2 \cdot n^2 \equiv \text{The Number of Electrons in Each-Space}$, A relation defining the number of Electrons in Orbits and The-Mendeleyev-Atoms-Table. Nature follows the Quantum-Space-Positions logic for each element agreeing with M-G.

e. The number of **Permutation** of the $n$-Spaces and of Repetition in the $2$-Sub-Spaces of the Two-Elements $[\oplus, \ominus]$ is equal to $P_1^2 \cdot \overline{R}_P^2 + P_2^2 \cdot \overline{R}_P^2 - n + 2 = 2 \cdot n^2 + (n-1)^2 + (n-2)^2 +...$ denoting the Total-number of Positions in Hydrogen-Caves.

f. In Fig-13, *The Elements → Proton $\equiv \oplus$, Electron $\equiv \ominus$, is The-Energy-Part of Atom*, while Neutron $\equiv (\oplus \leftrightarrow \ominus)$, *The-Space-Part of Atoms* as $0 \equiv [\ominus \rightarrow r \rightarrow \ominus]$, which both consist, The **Energy-Space-Universe-Model**.

**The Structure of Atom - Figure -13 :**

In (1) is, The **Point-Space-Cave** with *One-Charge-mass-Nucleus* in Hydrogen-Cave, and Charge - Orbit-Position-Elements $m = 0$, consists the **Proton-Ion** of Hydrogen-cave of Uniform-Magnetic-field-Strength = 4.1464883 Mega -Tesla and **Cyclotron-Frequency** $f_R = 1.189676.10^{15}$ H.

In (2) is, The **Vector-Space-Cave** $m = 1$, with **Two-Nucleus-masses** of **One-Charge** and with $2m^2 = 2$ Permitted-Orbit-Positions, per 2 Electrons for Stability, $\rightarrow$ consists the first, 3, Perpendicular-Plane-Permitted-Positions in Cave, for the $\rightarrow \text{Lissajous – Eight - Shapes}$, Because of the Linear-Vibrations $[\vec{x} + w^2 \cdot x = 0]$ of the three-masses, Occur on the Two **Perpendicular each other**, Line-Vectors of $\vec{x} \perp \vec{y}$, Plane above Shapes which for, a.. **Difference of Phase** $\phi_P = 90^\circ$ emission is $\rightarrow$ The Eight-Shapes $\odot$.

b.. **Difference of Phase** $\phi_P = 0^\circ$ emission is $\rightarrow$ The Ellipse-Shapes $\propto$.

c.. **Difference of Phase** $\phi_P = 45^\circ$ emission is $\rightarrow$ The Double-Saddle-Shapes $\beta, \odot$.

50

Photon Particle, Photon Wave OR The Duality Photon ???
For One-Nucleus-mass and One-Orbit-mass is produced the Atom-Nucleus-Orbit-Hook + Plane + [ANOH], which accumulates the Nutation-frequency used for Atoms-Bonding.

For any two masses in Nucleus and one mass on Orbit, three masses problem, issues the x ⊥ y, Plane giving the Transverse Electromagnetic waves.

In (2) is, The Plane-Space-Cave m = 2, with [2+1] = 3-Nucleus-masses of 2-Charges and with 2m² = 8 Permitted-Orbit-Positions, per 2 Electrons for Stability ← consists the Second Onion Plane-Energy-Volume, enveloping the Priors, Vector-Space-Cave - m + Plane + Vector + Point + [ANOH], and For the n-Proton [⊕], n-Electron [⊖], n-Neutron [⊖+⊖⊖], the issues the logic for Total number of Positions in the Hydrogen-Caves.

In (3) is, The Volume-Space-Cave m = 3, with [11x2] = 22-Nucleus-masses of 11-Charges and 2m² = 18 Permitted-Orbit-Positions, per 2 Electrons for Stability ← consists the Third Onion Space-Energy-Volume, enveloping the Priors, Vector-Space-Cave-m + Volume + Plane + Vector + Point + [ANOH], and for The Total Positions cave-number is filled with The Permutation number with Repetition of the Two - Elements in the n-Spaces and the Two Sub-Spaces which is P² = 2² = 2 ².

In (3) is. The m-th--Volume-Space-Cave with, m = m, with m² = M-Nucleus-masses of [M/2] Charges and with 2m² = 2m² Permitted-Orbit-Positions, per 2 Electrons for Stability, and consists the m-th - Onion -Space - Energy-Volume -Cave, enveloping the Priors → Volume + Plane + Vector + Point+ [ANOH] ← with the Three-Elements Space ⊕, Anti-Space ⊖, Material-Point [⊕→r →⊖] of Material-Geometry.

Because Be is Independent of the Electron-velocity vₑ and of the Cave-radius r, therefore electron is not accelerated in Magnetic-Field, but its Strength is Dependent on f, and q only. Because of this Velocity-lag allows the in Hydrogen-Storage without Inverse Impedance which exists in M-Point. Above Property makes Hydrogen-Cave a Uniform-Magnetic-field, Be.

Photon was proved to be a Material-point in cave r, where its Inner Storage is the Stationary-Standing-wave the Electromagnetic-Wave [E²+H²] =2(2r).c.sin 2φ with n-Lobes representing the Normal mode vibration with frequencies fₘ = n.f₁ = E/h = n.v₂ = nσ/gr [1+√5] and向外ward the Storage is the Electromagnetic-Wave →{[eE²+μB²]=2.λ.c.sin.2φ} ← where Particle 2r = n λ, Cave r, is the Electromagnetic Energy-Storage, and Electromagnetic Radiation E, B, is the Wave Conveyer of Cave, r, with frequency f = Energy E / Planck -constant h, or f = E / h which Photon-velocity ̅v = ̅c.[σ] + [σφ] = ̅c.[fₘ + fₙ] ... (f-v)

From relation Force G = σ A = (2πr²) A[̅c] = w r = ̅c . A[̅c] , i.e. Action of G → on ̅c and , Following relation σ x φₜ = G , from Energy-force Fₛ in r = Lₛ Planck’s scale of mass mₛ = J.w², where angular-velocity w = ̅c r and , The 3-Dimensional [2³ = ( ⊕→⊖ )³] Impedance gₓ, of Space ln(3) and Anti-Space π√3 ,Centrifugal-Force Fₛ = ̅g = mₛ [c²] = mₛ [c²] = J w² [c²] gₓ = [πr²/2] [c²]. [c²/2]. ln(3). π√3 = 4/3. In 3.π²rc⁴ = 9.8076754 m/s i.e. Gravity ̅g, is The effection of G Force, on ̅c light-velocity, In the 3-Dimensional Impedance of Space ln(3) and Anti-Space π√3 in 2³, Planck-length Lₛ = r, ... (g)
The Newton’s Universal Laws in Primary-Material-Points:

Above, is consisted of Two-Primary-Opposite-Spaces, (+) → ← (−). The Poles with Infinite points for Parallel-lines such that \( G \) is a **Uniform- Pointy-Force**.

The STPL - Mechanism is for constructing the Elementary Particles while the Material - Point, Photon and Photon - Charge, Light velocity \( c \), Gravity \( g \), Electrons \( e \) and \( e^{-} \) Charge, by the Gravitational constant \( G \).

---

**G … THE GRAVITATION CONSTANT ** \( G \).

1g. The Gravitation Constant \( G \) and Photon:

In universe **exists Only-One-Force**, The Gravitational-force \( G \), which is constant in all universe, therefore being constant, becomes from an Conservative –System .

In Mechanics, a force \( F \) produces the Work \( W \), when it removes the point of action from a Position, \( A \), to another Position, \( B \), as the equation, \( W = F \cdot ds \), where \( ds \) is the displacement \( |AB| \). This right definition automatically defines that all this work in universe, which is Space and Energy, has been produced by this Unique force \( G \).

It was prior proved, that one of the smallest Energy-Unit of Space is that of Planck’s length, and is an Energy-cave, and this because from (s) Space s = 0 and Type -k = 1. Energy which is motion is kept in Massive-Box-Bp called Photon or **Energy-Storage**.

The velocity of Photon is \( \vec{v} \cdot [\frac{c}{2\pi} + \frac{\phi}{2\pi}] \equiv \vec{v} \cdot [\frac{f_n}{n} + f_n] \), a Dual motion as,

---

1. **Energy-Storage** \( S \equiv [\oplus \leftarrow r \rightarrow \ominus] \equiv \text{Particle} [\vec{v} \cdot \frac{f_n}{n}] \rightarrow [\vec{v} = \vec{c} = \lambda \frac{f}{\phi} \rightarrow i.e. a Stationary Standing - Wave \rightarrow } \)

2. **Energy-Motion** \( M \equiv [\vec{v} \leftarrow \text{Vector}] \equiv \text{Wave} [\vec{v} \cdot \frac{f_n}{n}] \equiv [f_1 = (E^2 + H^2) = n \frac{\Phi \cdot \sigma}{2\pi r}] \equiv \vec{B} \rightarrow i.e. a Propagating Wave \{W \equiv EM-R \equiv [\epsilon E^2 + \mu B^2] = 2 \lambda c \sin 2\phi \} .

In both cases carry the in box Golden-ratio-frequency \( \Phi \), Everywhere and Anywhere such in microcosm and as in macrocosm.

Gravitational force \( G \) in order to communicate with another velocity-vector \( \vec{v} \) which is axial also, is needed to Have a Reaction to this motion, i.e. Gravitational-Energy \( G \) through Waves \( f_n \rightarrow [\text{on Material-Point Unit Spin } S \approx g] \) is acting on Stress \( \vec{g} \rightarrow \vec{g} \).

**Force G is Spread in a Layer–a Field** which is the Stable –Ocean -Spins \( S \) becoming from the Periodic motion, and thus Communicates through stress \( \vec{g} \) on \( S \) as Stress \( g \),

It was proved that the **Electron-Spin** is \( \rightarrow S/2 = 1,4603748, 10^{-34} \text{ Joules} \), which is
the same to the Material-point-Periodic-motion-Spin so ,from Bonded Tack-Geometry as.

1. A Charged-Particle, is a Particle with an electric charge, \( \oplus \) or \( \ominus \), produces an Electric-field \( \vec{E} \), which exerts a force \( \vec{F} \) on other charged Particles \( \vec{e} \). Positive charges \( +\vec{e} \) accelerate in the Direction \( \leftarrow \) of the Field \( \vec{E} \leftarrow \) and Negative charges \( -\vec{e} \) accelerate in a Direction Opposite \( \rightarrow \) to that of the field \( \vec{E} \).

2. A moving Charged-Particle, \( \oplus \) or \( \ominus \), produces a Magnetic-field \( \vec{B} \), which exerts a force \( \vec{F} \) on other moving charges \( \vec{e} \). The force \( \vec{F} \) of these charges is always perpendicular to the Direction of their Velocity-vector, therefore Velocity does not change and only the Direction of the Velocity-vector changes.

3. An accelerated-Charged-Particle, \( \overrightarrow{\oplus} \) or \( \overrightarrow{\ominus} \), produces an Electro-Magnetic-Wave \( \vec{E} \perp \vec{B} \), Perpendicular each other, which are Electric and Magnetic fields travelling through empty Space with the speed of light, \( c \), and which is a Charged-Particle oscillating about an fixed equilibrium Position. The oscillation frequency, \( f \), is the same to the E-M-Wave and which wavelength \( \lambda = c / f \). E-M-Waves transport Energy through Space and may be delivered any distance away from the Source.

4. Accelerated-Charges produce, Changing Electric and Magnetic-fields alternately, which leads to the Propagating-Electromagnetic-Waves. The Un-bonded-Force \( G \), or Gravitational-constant \( G \), was shown to be the Electric-Field-lines, i.e. the SPACE of a Huge-Electrostatic-Magnet from the Infinite-Dipole-Opposite-Primary-Charges which is The-ENERGY - PART, of the Two-Primary-Points \( \overrightarrow{\oplus} \) to \( \overrightarrow{\ominus} \).[84-86]

2g. The Electron and Photon charges:

**Figure 15. Conservation of motion \( \equiv \) Energy in the Primary-Material-Point-Field-lines:**
The Stationary-Charged-Particle is from equation, \( \mathbf{g}.\mathbf{f}^3.\pi^3 = 1 \), where \( \pi \) is the Closed Space, \( \pi g \) is the Stationary-Electric-Lines, and \( \mathbf{f}^3 = \sqrt{\frac{1}{\pi^3} - \frac{1}{\pi^3}} \), the motion = Energy = the Stress in the Two and Opposite-Spaces, \( \mathbf{\{+\} \rightarrow \{-\}} \), or in the consisted Poles, with Infinite Points and Parallel-lines such as \( \mathbf{G} \) which is as An-Uniform-Pointy-Force.
Electrons can be spinning clockwise or anti-clockwise and propagate on a Spiral trajectory.
A true definition of what is Electric-Charge and Electricity based on above follows.

In [1] **The-Stationary-Electron-Charge** Becomes from E-equation \( \bar{q} \equiv \frac{me^2}{2} = \frac{g c^2}{8\pi f^2} \)
while for Photon is directly from \( G = F = \sigma A = (2\pi f r) \frac{\Delta}{\Phi} = \omega \frac{\Delta}{\Phi} = \bar{v} \frac{\Delta}{\Phi} = \sigma \Phi^3 \), which is
a straight-line-Voltage. Since Energy is produced from motion, which is the continuous
removal of \( \{+\} \to \{-\} \) and because it occurs in Closed-loops, The Electric-Field-lines are
Straight-lines, in Space \( \Phi \) and Energy-Field \( \sigma \) and when these Pass from \( g \) ocean then
continue to be Straight-lines, and this because Total-work \( W = F.s = F.0 = 0 \).

**The Geometry of cave** ( Tack-Geometry ) controls the Electric-field and the Stability from
\( g \) while equilbrium from \( g \) \( f \pi \), and created from the two opposite Angular Momentum
vectors, \( M_u, M_d \), at distance, \( r \), and thus is created the \( E - \text{Spin} \) as \( 2S = M_u \times \{+\} \to \{-\} \),
and is acting on \( \{+\} \to \{-\} \) axis i.e. **The Stationary- Electron - Charge is the Storage of**
\( r = L_p \), cave in-where the Space and Anti-space, as \( \pi g \), and as Stationary-Electric-Lines are
creating Potential-Energy \( P_E \), with such Geometry that, to exist from the linear-motion
stored in the form of Dipole-Rotation with a changing-Spin, \( S \), and of frequency \( f = 1/T \)
in the min-cave. Here is cleared that frequency \( f_n = \sqrt{\frac{g}{2\pi r^3}} \) of Electron is Energy as angular
velocity vector motion in \( r \) cave, and this is because in cave exists the Natural-Frequency
\( f_n = \frac{\pi}{T} = \frac{\sqrt{g}}{4r} = \frac{2\pi f}{\pi} \) which Amplitude is Independent of motion,
and its velocity \( \bar{v} = \left[ \frac{\bar{g} \Phi}{\Delta A} \right] \), is Dependent on Impedance \( Z_p \) of Space A.

In [2] the **Electrostatic Unit of Charge** \( \bar{q}_p \), the Quantum of All, which when concentrated at
Point \( \{+\} \) and placed at a unit distance from an equal and Opposite concentrated quantity \(-\),
Is the Pulling with a Unit-force. Mass \( m_e \) is the reaction to this Inner motion of \( \{+\} \to \{-\} \)
and consists the Granular-Storage of Energy motion, which is vibration in a closed loop,
and it is a measurable Physical-quantity denoting the Geometry of Electron in \( r \) cave, and
Periodic motion. The Geometry of the Periodic motion issues the same such as for Electron
and for Material point with different cave and one-frequency as \( f_n = \left( \frac{1 + \sqrt{5}}{4\pi r} \right) \sigma = \frac{\sigma \Phi}{2\pi r} = \frac{\bar{B}}{\pi^2 r^4} \)
Electric-current is then The flow of the Electric-Charges and which is the moving-quantity of
Charges. Since **Electrons** and **Electric Charges** exists in , \( g \pi \) loop-level, therefore IS the
Property that controls all interactions between Bodies through these **Electrical-forces**.

In [2] **The-Stationary-Photon-Charge** is the case of Material point with **Periodic Orbital motion**
where issues the Tack-Geometry i.e. the tracks of the Electric-lines Pattern are
closed loops and not straight-lines, and also because of the Voltage between the ends, is
created the motion as an **Eternal rotation** of the [\( \Theta \)] constituent towards [\( \Theta \)] constituent,
[ The opposite issues for Rotational motion where in the **Moving-Photon-Tank** and because of
Stress , \( \sigma \), is created the Centrifugal-Force \( F \)],. and \( \bar{v} = \left[ \frac{G \Phi}{A} \right] \). Because \( f_n = \frac{\bar{B}}{\pi^2 r^4} = \frac{\sigma^2 \Phi^2}{4 \bar{B}} \)
so , Stress \( \sigma = 0 \to \sigma \), and \( \bar{B} = \text{Angular-Momentum} = \text{AM independent of} \ \sigma \.
\to \text{AM} \), and Spin is equal to \( \text{AM} / \text{Unit-Area} = \text{AM} / \pi \), and because of the Closed
**One-way-loops** , **Spin is either Positive or Negative** and is \( \to \text{Electric-Charge} E \)
\( \bar{E} = \pm \text{AM} / \pi = \text{Electron-Spin} = \text{The} \pm \text{Electron} \).
Above Spin disappears the ERP Paradox because is extended and actually is filling up
the entire universe. These Stationary-Particles are permanently entangled, with Wave
packets becoming from M-P-Photons, which Orientate and Re-orientate their Spins.
In [3] the The-Moving-Electron-Charge is consisted of the above Energy-Storage, the \( g \) in min-cave, occupying All Properties of the Stationary-Electron-Charge and additionally the Kinetic-energy \( E = \frac{m_e v^2}{2} = g \cdot v_e^2 / 8 \pi \) \( f_e^2 = \frac{q_e}{e} V = h \cdot f_e \), and \( g \cdot v_e^2 = 8 \pi f_e \cdot v_e^3 \) or
\[
[v_e^2/f_e^3] = 8\pi / g = \text{constant}, \quad \text{or} \quad v_e^2 / f_e^3 = k, \quad \text{and} \quad v_e^2 \cdot T_e^3 = \frac{f_e^3}{f} = f^3 \left( \frac{T}{\lambda} \right)^2 = f^3 \left( \frac{L}{\lambda} \right)^2 = \lambda^2 \quad \text{i.e.}
\]
The \textbf{Electron-velocity squared} to the \textbf{Electron's - cube Frequency} is constant following the Orbit-Unit-Energy equation \( k = f_e^2 \cdot a^3 \), and equal to the Inverse \( f \) squared to the \textbf{Electron's-cube Frequency} in wavelength \( \lambda \) interchanged and keeping light-velocity \( c \) without any other Force acting on them.

This Kinetic-Energy creates angular velocity \( \omega = 2E/B = \frac{m_e v^2}{B} \) and the Inwards transverse Electromagnetic-Waves, \( E \perp M \), travelling with \( v_e \), inner velocity as \( E = A \cdot \sin[kx-wt] \) and as \( M = A \cdot \sin[kx-wt] \), and \( E = M = A \cdot 1 - \sin wt \), since \( \sin kx = 0 \).

\textbf{i.e. The Moving-Electron-Charge is The Electromagnetic-Wave,} \( E \perp M \), which carries the Stationary-Electron-Charge, \textit{and which is} The \textbf{STORAGE} of \( g \), in min-cave, in-where the Potential-Energy \( P_E \), as linear-motion in \( \mathbf{g} \equiv \mathbf{r} \) cave is stored in the form of Dipole-rotation, \textbf{Angular-momentum due to curved motion}, with Spin, \( S \), directed from \( \{-\} \rightarrow \{+\} \) and to G-Primary-Direction of frequency \( f = 1/T \), and which is the Source in cave \( \mathbf{r} \).

\textbf{3.g. The Elements needed in Cave for Black-Hole-Genesis}.

Both motions, \textbf{Periodic and Rotational}, exist as the Mean between the Two Primary-Opposite in PNS \( \equiv \) Primary-Neutral-Space. This Mean is the Ocean of the, \textbf{Two kinds of Spins} created from the inner motion in Material-points both Oriented by the acceleration \( g \) created from Rotational-motion and which \( g \), continually effects on Spins through which force \( G \), Flows to all Energy structures.

From \( r_{\text{min}} = 1.07 \times 10^{-7} \) m and \( f_p^2 = \frac{1}{f^3} \) then \( f_{\text{min}} = 2.839844.10^{10} \) H, and Bonding Energy \( L \equiv E = h_f = 6.62607.10^{-34} \cdot 2.839844.10^{10} J / 1.6.10^{-19} = 1.76063.10^{-6} \) eV or in Joule \( = 1.8817009.10^{-23} J = (Kg.m2/s^2) \). Hydrogen cave was found \( a_H = 2.11450164.10^{-11} \) m and from Orbit-Quantum-Energy \( f^2_H = \frac{1}{g \cdot r^3} = \frac{1}{9,8076754.2(1145.10^{-11})} = 10,784767 \cdot 10^{30} \)

or \( f_H = 3.284017.10^{15} \) H, while Nutation-Frequency \( f_n = \frac{sQ}{2\pi.3^2w} = 2.8398447.10^{10} \) s^{-1}

Energy in caves \( E_k = \frac{\pi g r}{2} + \frac{L^2}{2m r^2} \) = \( \frac{2\pi g r^2 + L^2 f}{2r^2} \) \( g \cdot r + L^2 f \) \[ \] (1) It was proved also that magnitude \( \mathbf{L} = \mathbf{\dot{a}} \times \mathbf{\vec{v}} = \text{Constant} \) for all central motions. For circular orbits gravitational force \( G_F \) equals the centripetal force \( C_F \), so \( C_F = G_F \) and \( m \cdot v^2 / R = (Gm \cdot m_s / R^2) \) and velocity \( v^2 = GM / R \). Substituting the expression into the formula for Kinetic - Energy then, \( K_F = \frac{m v^2}{2} = \frac{m GM}{2 \cdot R} \), or \( K_F = (1/2) \cdot (-P_E) = - \frac{P_E}{2} \) and \( \rightarrow - P_E = 2 \cdot K_F \) \[ \] ....(2)

The Total-energy \( E \) = \( K_E + P_E = K_E - 2 \cdot K_E = - K_E \), i.e. \textbf{The Potential - Energy} \( P_E \) is \textit{Always - Negative} and \textit{Twice the Kinetic-Energy While The Total - Energy E, of an Central-Orbiting-System is Negative}. The ratio \( L / E \equiv (-P_E) / (-K_E) = (2 \cdot K_E) / (-K_E) \equiv - 2 \)

Placing (2) in (1) then \( E = \left( \frac{g \cdot \pi r^3}{2} + \frac{L^2}{2m r^2} \right) \) and \( E = \left( \frac{g \cdot \pi r^3}{2} + \frac{E^2}{2m r^2} \right) \) or \( E^2 = 4mr \cdot E + g \cdot \pi = 0 \) \[ \] An 2nd degree Equation with solution \( E = \frac{4mr}{2} \pm \frac{1}{2} \sqrt{16m^2 r^2 - 4\pi g} \) \[ \] .......(3)

Photon Particle, Photon Wave OR The Duality Photon ??
Since E must always be Negative then $16m^2r^2 + 16m^2r - 4\pi g < 0$ or $23m^2r^2 \leq 4\pi g$
and by placing electron mass $m_e = \frac{e}{4\pi\epsilon_0}$ then , $\frac{e}{4\pi\epsilon_0} \cdot 4r < \sqrt{2\pi g}$ or $f^4 > \frac{e^2r}{2\pi^2}$
and for Hydrogen cave $r = 2,1145016.10^{-11}$ m
then $f > 2,8998506.10^{-6}$ Hz
i.e. a frequency corresponding to an energy $E = 12.10^{-6}$ eV in a cave $a = \frac{1}{\sqrt{g \cdot f^2}} = 2297$ m.

The kicked-Energy is $\rightarrow \vec{B}.f_n = E \equiv \left[ \frac{\Phi}{4\pi} \right] = 1,4603748.10^{-34} \cdot 2,89985.10^{-6} = 4,23487.10^{-6}$
Equation (3) $0 \leq 4\pi g \leq 0 \equiv 4.\pi [4\sqrt{3} \ln(3) \cdot \pi^2 r c^4] = 16\sqrt{3} \ln(3) \cdot \pi^2 L_p c^4 = 0 \ldots (4)$
and from $c = \frac{G \Phi}{A} = \frac{G \Phi}{e^{-i(\frac{\pi}{4})}b}$ , where $A = \sqrt{-i} = e^{-i(\frac{\pi}{4})}b >>$ Anti-Space + Space-Positions
i.e. as soon as $A = \{ The \ Space + Anti-Space \ Positions \ in \ Universe \} , \ become \ Inadequate
for Energy-Storage $A = e^{-i(\frac{\pi}{4})}b = 0,207879576.b = 3.2^2 = 12 \cdot $Times-Less \ The \ Necessary ,
The $\rightarrow$ Velocity-Vectors $\equiv$ motion $\leftarrow$ Burst Into another cave a of $L_p$ , connected to $G$ , and which Is an Overflow of Energy in \ , Space + Anti-Space Positions \ . [58]

Black Holes Follow Kepler laws , where , On any moving Particle when Tangentially colliding or under any angle $\Phi$ , with a Material-Point executing Circular motion , then the Total Energy is $E$ , and the Particle follows constant Elliptical Energy - Orbits on the same semi major axis as equation , $I = c \cdot f_n \cdot a^3$ , and of the same constant Energy . Semi major axis , $a$ , is related to energy as $\rightarrow a = G \ M \ m / 2E$ , and for ellipse (a b axis)
\[
\frac{B^2}{(ma)^2} = \frac{q_1 \ a}{(ma)^3} \quad \text{and Spin} \ |\vec{B}|^2 \equiv |\vec{B}|^2 \equiv m \ q_1 \ a \ b^2 \quad \text{or} \quad \vec{B} \equiv 2^2 \ a \ b \ q_1 \ a, \quad \text{for a=b}
\]
i.e. for very large Energies , semi major axis tents to a Negative-Energy-Point ,which is the beginning of the Black hole such as in microcosm and macrocosm. For axis $a \rightarrow 0 \pm$, then $f_n \rightarrow \infty$ , or $E \rightarrow \infty$ , which is a Black-hole . [61]

In Black-holes where exists the Rotation-Energy , the Spin ,velocities follow Quantization of Unit-velocity as $v = 2\pi f_1 \cdot (n \ c/2f_1) = n.\pi.\epsilon$ . From prior relations in B-Holes-Energy is found the SPIN $S = B$ , using equation $- |\vec{B}|^2 = \pi G \ \Phi^2 \ r^4 = |\pi r^4 \ \Phi^2| \quad \rightarrow \text{when radius} \ r$ , is measured . Angular-Momentum $\vec{B} = \frac{2L}{w} = \frac{2L}{2W} = \frac{2\pi r^4 f}{2}$ , and vector $\vec{B} = a \ m \ v$ , becomes
\[
\vec{B} \equiv a \ m \ v = 2,11450164.10^{-11} \ m \cdot 7,237315.10^{-32} \ kg \cdot 2,997978 \cdot 10^8 = 4,5879026.10^{-34} \ / \pi \text{and} \rightarrow S/2 = 1,4603748.10^{-34} \text{which is the E-Spin. From cave-relation , a cave , as} \ a = d = \sqrt{\frac{1}{9,808,923m^2}} = \sqrt{5,610,229,80.10^{-30}} = a = 1,77688867.10^{-10} \ m \text{, then Bracket-length}
\]
$\Delta = 2a = 3, 551,727.10^{-10} \ m$ .The Black-Hole-Gravity-equation related to the Inner Quantum-velocity $v$ , and to its $n \ , \ lobes$ is the frequency squared as ,
\[
f^2 = \frac{\pi g}{[2\pi r^4]} = \frac{\pi g}{|v = \omega r^2|} = \frac{\pi g}{|v = n.\pi.\epsilon|^3} = \frac{\pi g}{[n.\pi.\epsilon]^3} , \ Energy \ decreases .
\]
Gravity $g \equiv \sigma = \frac{F}{\text{Area}} \Rightarrow \frac{\text{Mass}}{\text{Area}} = \frac{G}{k} \quad \text{, while Gravity force} \ [\vec{V}] \equiv F_g \equiv m_g \ g \Rightarrow \vec{g} \sqrt{\frac{\sigma}{\epsilon}}$. $r = \frac{m_g \ v^2}{r} = J w^2 g \Rightarrow [n.\pi.\epsilon]$, then $\vec{B} = f^4 \ a^2 \ H \Phi$, and $\rightarrow [\vec{B}]^2 = \left[ f^2 \ a^2 \ H \Phi \right]^2 \quad \rightarrow \text{while as Centrifugal is the}
\rightarrow \text{Gravity-force} \ F_g \equiv m_g \ g \Rightarrow g \sqrt{[\sigma/c]} \ / \ r = \frac{m_g \ c^2}{r} = J w^2 \ \ g \Rightarrow \frac{v^2}{r} = \frac{c^2}{r} = \frac{\pi r^4 \ v^2}{2}$ and is The Black-Hole-Gravity-equation related to the Inner Quantum-velocity $v$ to its $n$ lobes .

56 Photon Particle , Photon Wave OR The Duality Photon ???
Gravity-Acceleration is \( g_G = s \left[ \frac{\text{nr}^4}{2} \right] = \left[ 3.1415926(\sqrt[3]{5} + 1) \sqrt[3]{1.10^{-35}} \right] (299793458)^4 \),\( e^3 = 6.044981.10^{-35} \times 80,776078.10^{32} \).  
From the Primary equation of Electron \( \rightarrow \ w^2 \) \( \cdot \) \( m_e = \pi \ g = \text{constant} \equiv \text{Energy} \equiv \) 

\[ \text{[meter of area} \times \text{meter of force}] = \text{Electrons on Orbits} \), on Traces and also the Unit Space \( \equiv \text{Massive-Unit-Unit-Space} \equiv [+\dot{v}.s^3] \leftarrow \text{The Nucleus} \text{ joined through the Neutral Material-Points } [\{+\} [\leftrightarrow (-)] \text{ with the Strong-force} \rightarrow S_f = h \cdot f_n \equiv h \cdot [\{S \equiv B_p \} = \text{EM-R} \equiv f_1 = n, f_2 , f_3 , f_0 , f_n = w^2] = h \cdot n \left( \frac{1 + \sqrt[3]{5}}{4 \pi} \right) \equiv h \frac{2 \delta}{\pi \cdot r} \), Energy increases \((\text{mg})\). 

From relation Force \( G = \sigma A = (2 \pi f)^2 \) \( \equiv \) \( r \) \( \equiv \text{Action} \) \( \rightarrow \) \( \text{G} \) \( \rightarrow \) \( \phi \equiv \phi \), i.e. Action of \( G \rightarrow \) \( \phi \) and \( \omega \), following relation of \( \phi \equiv \phi \equiv \gamma \equiv G \), from Energy-force \( F_g \) \( \equiv \text{Planck’s scale of mass} \) \( m_g = J \cdot w^2 \), where angular-velocity \( w = \frac{c}{r} \), and \( \theta \), from 3-Dimensional \( [\theta^2 = (\begin{pmatrix} \phi \rightarrow \phi \end{pmatrix})] \) Impedance \( g_Z \), of Space \( \ln(3) \) and Anti-Space \( \pi \sqrt{3} \), then the Centrifugal-Force \( F_g \) is \( F_g = m_g \left( \frac{c^2}{r^2} \right) \), \( J \cdot w^2 \cdot g_Z = \left( \frac{m_k^4}{r^2} \right) \left( \frac{c^2}{r^2} \right) \). \( 2 \cdot 3 \cdot \ln(3) \). \( \pi \sqrt{3} \) \( = 4 \sqrt{3} \ln 3 \cdot \pi \cdot r^2 \cdot c \), and \( F_g = \bar{g} = 4. \sqrt{3}.1.0986122886681.\pi^2.1.616199.10^{-35} \times 299793458.10^{-2} \times 9.8076754 \) \( \approx \) 6,805651.10^{-11} \( \rightarrow \) \( G \) \( \equiv \) \( \text{Energy} \equiv \) \( \text{Pressure everywhere} \) in all the Energy structures. Energy as motion defines In-Box, the minimum \( \text{Resonance-Golden-ratio frequency} \) \( f_R = f_1 \), which \( \text{following Kepler constant for microcosm} \) and frequency \( f_R \) defines \( \text{Photon Particle} \), \( \text{Photon Wave} \) or \( \text{The Duality Photon} \) \( ?? \)
in Outer-Box the Electromagnetic Radiation which is the Conveyer, the carrier of the Energy-Cave, \( r \). The Reality is the Energy-Space United-universe of one Force which produces Work \( \equiv \text{Force} \times \text{Space} \), and which is conserved as motion in all Space-Boxes. Potential-Energy \( \equiv P_E \) stored in Material-point is the Electric-Field \( \mathbf{E} = g \mathbf{\pi} \), in where \( \oplus \) moves to \( \ominus \) and thus from Geometry-Shape are created the two opposite Angular-momentum vectors and from Dipole the Spin \( \mathbf{S} = \frac{1}{2} \) in \( r \) cave filling the whole universe.

In Periodic-Orbital-motion issues Tack-Geometry i.e. the tracks of the Electric lines are Pattern of closed-loops-Pairs, starting Clock-wise and Anti-clockwise from the \( \oplus \) Spring not as straight-lines because of the voltage between ends of Spaces, and the created motion as an Eternal rotation of the \( \oplus \) constituent towards \( \ominus \) constituent. In both cases Angular momentum \( \mathbf{B} \), is equal to \( \pm \text{Spin} \mathbf{S} \). Material Points, Segments etc. consisting the Physical Structures. In the finite-Space of Material-point, \( \text{case} \mathbf{r} \), is stored the Work as frequencies, Because Stress \( \sigma > 0 \), Spin \( \equiv \)Angular momentum \( \mathbf{B} \), is equal to AM / Unit-Area = AM / \( \pi \), and frequency \( f_n = \frac{B}{\pi r^3} \) so Spin is either Positive or Negative and equal to the Electric-Charge \( \mathbf{E} = \pm \text{AM} / \pi \). The Spin becomes from the \( \uparrow \leftrightarrow \downarrow \) Antiparallel Angular - Momentum-vectors \( \mathbf{B} \), which is equal to the Golden-ratio, \( \text{Spin of cave} \mathbf{r} \) , the Spinning-Stationary M-point with Fundamental frequency \( f_1 \) of equation \( W = \left( \frac{4\pi^3}{3} \right) f_1 = \left( \frac{1 + \sqrt{5}}{2} \right) \frac{\sigma r^2}{3} = 2L = \mathbf{B} \cdot \mathbf{\bar{w}} = Jw^2 \).

This Stationary–Energy-Storage is as Coulomb Electrical-Force where the Electrical-Force

\[
\mathbf{F}_{\text{electron}} = k_c \frac{Q_1 Q_2}{d^2} = \left( \frac{\oplus \leftrightarrow \ominus \mathbf{0} \cap \mathbf{0}}{d^2} \right) = k_c \frac{2\sigma}{\mid \mathbf{r} \mid} = k_c \frac{4\pi f_1}{r \Phi} = k_c \frac{\sigma}{2r^2} = k_c \frac{2c}{r \Phi} \text{ in Box } B_e \text{ and for Photon}
\]

\[
\mathbf{F}_{\text{photon}} = \left( \frac{\oplus \leftrightarrow \ominus \mathbf{0} \cap \mathbf{0}}{r^2} \right) = \left( \frac{\sigma}{r^2} \right) = \left( \frac{2\pi f_2}{\Phi} \right) = \left( \frac{w}{\Phi} \right) = \left( \frac{2L}{r \Phi} \right) = \left( \frac{\bar{c}}{r \Phi} \right)^2, \text{ in the same Box } B_e, \text{ since}
\]

Angular-momentum \( \equiv \text{Spin} \equiv \frac{\mathbf{B}}{4} \left( 1 + \sqrt{5} \right) = \left| \frac{\pi r^3 \Phi}{2} \right| = \left| \frac{\pi r^3 c}{2} \right| \), as Orbit-Forces.

Above relation agrees with Laplace-equations for Incompressibility and Irrotationality where \( \nabla x \mathbf{\bar{Q}} = \mathbf{\bar{F}}_x + \mathbf{\bar{V}}_y = 0 \), and \( \nabla \cdot \mathbf{\bar{V}} = \mathbf{\bar{V}}_x - \mathbf{\bar{V}}_y = 0 \), meaning that Space, \( \mathbf{\bar{F}} \), and Energy, \( \mathbf{\bar{V}} = \) motion are Interchanged \( \rightarrow \) Because from the first relation the Magnetic-field-Space \( \mathbf{r}_x \) creates the Electric-field-Energy \( \mathbf{\bar{V}}_y \), and from the second \( \rightarrow \) Energy \( \mathbf{\bar{V}}_x \) Pushes the Space \( \mathbf{\bar{r}}_x \). From Electron-Orbit-equation \( 4\pi^2 f_2^2 e \cdot m_e = k = \pi g \) or \( 4\pi f_2^2 e \cdot m_e = g \), \( k = \pi g \), they denote \( \ominus \) Space \( \equiv \text{Electric-field in-where exist Electric-lines i.e. the tracks of Electron motion of the} \ominus \text{Anti-space} \). The Right Momentum vector AM \( \equiv \uparrow \) is the Produced Work and stored in Magnetic-field as motion while left-vector AM \( \equiv \downarrow \) is the Produced Work and stored in the opposite Magnetic field as motion and both consist the Dipole \( \oplus \left( \leftrightarrow \ominus \right) \), Tack-Geometry.

The Chains of Stationary-Periodic-Spins are Pointy-vibrating in Orbit LRC- Circuit with its frequencies \( \{ f_1 = \frac{(1 + \sqrt{5}) \sigma}{4\pi r^3}, B = [\sigma \Phi r^2] f = \frac{B^2}{\pi^2 \cdot r^4} = [\sigma^2 \Phi^2 / 2\pi^2 c] B \}, \) filling up the entire universe.

Stationary-Electron-Charge \( q \equiv \ominus \), with Orbit-Velocity-Vector \( \mathbf{\bar{V}} = \sqrt{\frac{2}{m} \left[ E - \left( \frac{k}{r} + \frac{L^2}{2mr^2} \right) \right]} \).
occupies Zero Kinetic-energy between Q₁, Q₂ therefore, \( K_E = \frac{mv^2}{2} = E - \left( \frac{k}{r} + \frac{L^2}{2m r^2} \right) = 0 \)
or \( E = \left( \frac{k}{r} + \frac{L^2}{2m r^2} \right) + \frac{s^2}{2 (g/4 \pi r^2)} \)

\( \approx \frac{2 \pi \sigma g r}{8 r^2} \) \( \text{...(s)} \)

Equation (s) issues for Spinning Points, and Atoms-Stationary-nucleus and is **the Strong-Force** between Nucleus-Protons.

---

**Figure – 17.** The Newton’s Universal Laws in Atoms and in Onion - Structures.

The Slit-Focus-Atom structure with the three Hydrogen – Orbitals.

The Neutral Material-Points \([ \rightarrow ] \) with the **Strong –Nuclear - Force**

\[ S_F = h f_n \equiv h \cdot \left[ \left( S \equiv B_p \equiv EM \cdot R \equiv f_1 = \text{N}, f_2, f_3, f_D, f_n \right) \right] \equiv h n \left( \frac{1 + \sqrt{5}}{4 \pi} \sigma \right) \equiv h \frac{n \sigma B}{8 \pi r^2} \]

are so because \( f_n = \frac{\sigma^2 \sigma^2}{2 \pi c} |B| \), and it is the DNA of all Energy-Structures.

In Fig-17- , The Vector-Space-Cave \( m = 1 \), with Two-Nucleus-masses of One-Charge and with \( 2m^2 = 2 \) Permitted-Orbit-Positions, per 2 Electrons for Stability, consists the first, 3, Perpendicular-Plane-Permitted-Positions in Cave, for the \( \rightarrow \) **Lissajous – Eight - Shapes**.

The Linear-Vibrations \( \left[ \dddot{x} + w^2 x = 0 \right] \) of the 3-masses, Occur on the Two Perpendicular each other, Line-Vectors of \( x \perp y \) Plane, as above Shapes which for,

  a.. Difference of Phase \( \varphi = 90^\circ \) emission is \( \rightarrow \) The Eight-Shapes \( \odot \) on Nucleus.

  b.. Difference of Phase \( \varphi = 0^\circ \) emission is \( \rightarrow \) The Ellipse-Shapes \( \propto \), after 1st curve.

  c.. Difference of Phase \( \varphi = 45^\circ \) emission is \( \rightarrow \) The Double-Saddle-Shapes \( \odot, \odot \), on the two, One Proton and One Neutron-Nucleus. Circular-motion happens after the Lissajous-Shapes on Elements \( 2m^2 = 2.4 = 8 \) region which is the Helium cave.
**Figure – 18:** Photo from RESOLUTION OF THE RUSSIAN THEORY OF MICROWORLD

By Professor Ph. M. Kanarev [kanarevfm@mail.ru]

In-a- Is shown the structure of Graphene (Regular Hexagon of E-geometry) in a higher Level.
In-b-d Is shown the Regular Hexagon structure with Nucleus, Core, to be the Torsional missing link of Cluster, and this because Core is a Cave.
In-c- Is shown the Hexagon structure becoming from the Triangle, times, two Units each point and is equal to Six units, or (3 vertex x 2 units = 6 Units), for any compound Cluster.
In-c-d Hexagon shape is because in Photos is included the Projective Plane of Graphene only.

The Plane Directions, for the Steady - Triangle Shapes, of 3 x 2 = 6 (±) elements, is the Regular-Hexagon-Plane-Bonding. The Hydrogen-Light-Photon-cave 2.114501610^{-11} m as well the Inverse Electromagnetic-Radiation Show the above, Photos in 3-D.
The Plane Bonding of Atoms follows The Stability of Material-Geometry [86].

**Figure – 19:** The One HYDROGEN-SLIT is The First – Nucleus-Bracket-Bond. The One HYDROGEN-ORBIT is the First PROTON-ORBIT-HOOK on the Helium-Atom-Nucleus-Bracket and exist, Two –Slit-Direcions. The One Helium-Atom-Orbit is for, Two Proton-Hook-Direcions (90 -180⁰) so the Two Points-Hooks (H – H) > can Bond from Square bonding to any Rhombus Shapes.

**Figure – 20:** On The Lithium-Atom with the Three of angle 120⁰ -Plane Directions of the Orbit-Hooks can Bond, on Plane Directions, in Steady – Triangle - Shape which is The Regular-Hexagon-Plane-Bonding.

5g... The Periodic motion in all Displacements:
Figure – 21- : The Two Possible motions in caves , The Periodic and The Rotational : 

In (1). Is formatted the Energy-Space of the Orbital-Periodic-motion \( [\oplus \leftrightarrow \to \ominus] \) in Tack-Geometry-Pattern (1) and (2) formulation, where Hydrogen minimum cave \( a \) is

\[
a = 3 \sqrt{\frac{1}{k_f^2}} = 3 \sqrt{\frac{1}{g f}}, \text{ and for } k = g, \text{ and } f = E / h = 13.6 \text{ eV/h} = \text{Unit-Energy-Space-frequency}
\]

\[
f = 3.28393.10^{15}/s , \text{ of cave } \ a = 2.11450164.10^{-11} \text{ m}.
\]

From Linear-Periodic-motion

\[
\frac{w_a}{2\pi} = f_e = \frac{1}{2\pi} \sqrt{\frac{k}{m}}, \text{ or } 4 \pi^2 f_e^2 = k = \pi g , \text{ then for Electron } m_e = \frac{g}{4 \pi^2 f_e^2} \text{ so ,}
\]

\[
m_e = \frac{g}{4 \pi^2 f_e^2} = \frac{9.808238}{4.315[3.28399.10^{15}]} = - 7, 2373149.10^{-32} \text{ kg,}\ f_e = 3, 283998.10^{15} / s ,
\]

The Spin-Cave is equal to The Moment of couple from two \( \uparrow \leftrightarrow \downarrow \) Angular-momentum Vectors as \( \vec{B} = a m v = 2.11450164.10^{-11} \text{ m } .72373149.10^{-32} \text{ kg, 2.99798.10}^8 = 4.5879026.10^{-34} / \pi \), and Spin \( \to S/2 = 1.4603748.10^{-34} \) which is the Electron-Spin. The Spin\( k = \pi g \), denotes the \( \oplus \text{ Space} \equiv \text{Electric-field in-where exist the Electric-lines the tracks for the motion of electrons } \ominus \text{ Anti-space} \). The Right angular momentum vector AM \( \equiv \uparrow \) is the Produced Work and stored in Magnetic-field as motion while left-vector AM \( \equiv \downarrow \) is the Produced Work and stored in the Opposite Magnetic field as motion and both consist the Dipole-vector \( [\oplus \oplus \ominus \ominus] \) directed to \( [\oplus \to \ominus] \) as it is Tack-Geometry.

For Quantum-Energy equal to \( g \) then \( k = g \), and \( a = 3 \sqrt{\frac{1}{k_f^2}} = 3 \sqrt{\frac{1}{k_f^2}} = \frac{h^2}{k E^2} \) \( \text{or } = 3 \sqrt{\frac{h^2}{g E^2}} \)

the corresponding cave \( a \) is for Energy-monads ,

In (2). Is formatted the Energy-Space of M-P vibration of opposites which creates a wave which has an Electric \( E \), and an Magnetic component \( H \), perpendicular each other and is as \( [E^2+H^2] = 2.(2r).c.\sin2\phi \) on where does Not-exists the Skin-effect and this because of the Laplace \( \nabla f = 0 \) equation issuing in Tack-Geometry. The Property of Periodic-motion in M-P conserves The Inner-Magnetic-Wave, into the Centre of mass-Charges with an changeable Spin \( S \), between \(- S \), to \(+ S \), resulting to a Stationary-State. i.e. it is a continuous \(- S + S = 0 \), Torsional and Point-equilibrium, where Charge is equal to the Angular Momentum-vector per Unit-Plane or \( S = \text{AM} / \pi = r m v = [a m c] / \pi \)

\[
\text{Spin } S = \frac{amc}{\pi} \Rightarrow \vec{B} = \frac{2L}{\hbar} = \frac{2L}{2\pi f} = \pi^2 r f^2 \text{ = The Spin of Particle-cave .}
\]

Above Double-Orbital-Periodic motion \( [\oplus \leftrightarrow \ominus] \) in a Material-Point is the eternal-Plane-Curve-motion of the \( \oplus \) constituent to the \( \ominus \) constituent in the two \( x, z \), axis of Photon Particle , Photon Wave OR The Duality Photon ???
motion. Considering the distance of motion be , the diameter of the cave , \( l = 2r \), then velocities as angular velocity , \( \omega \), and velocity , \( v \), under the condition \( y(2r,0) = 0 \), then leads to Energy-equation \( \sin \frac{2rw}{v} = 0 \), or \( w = \frac{2r}{v} = n \frac{4\pi r}{\lambda} = \frac{4\pi rf}{v} \), where \( n = 1, 0, \lambda = \frac{c}{f} \) and is the wavelength and \( f \), is the frequency of oscillation , \textit{i.e.} The , \( n = 1 \), defines a Normal mode vibration with natural frequency \( \rightarrow f_n = \frac{v}{2\pi r} = \frac{\sigma}{4\pi} [1+\sqrt{5}] \) ....(n)

Above Double-Orbital-motion is in a Uniform-Energy-Point-Space as this is for Spin \( S = \vec{B} \) and then Issues \( \vec{B} = \vec{r} m \vec{v} = \sqrt{r^2 + m^2 v^2} \), because the vector \( \vec{r} \equiv \text{Space} \), is Perpendicular to \( m\vec{v} \equiv \text{The Energy} \). Laplace Energy-equation for Incompressible Space \( \vec{r} \), is \( \rightarrow \nabla^2 E = - \nabla E = - \nabla \sqrt{\vec{r}^2 + m^2 \vec{v}^2} \) and squaring \( \nabla \vec{r}^2 + [2\pi mf\vec{a}]^2 = 0 \) issues \( \vec{r} = -2\pi mf\vec{a} \) ...(1)

The condition for Irrotational Energy is \( \rightarrow \nabla x \vec{B} = \nabla x \vec{S} = 0 \), or \( \nabla x \vec{B} = \nabla \vec{r} + 2\pi mf\vec{a} = 0 \), and vector \( \vec{r} = 2\pi mf\vec{a} \) .....(2).

Relations (1), (2), + \( \vec{a} \) and \( - \vec{a} \), denote the Alternative-Positions of Magnetic Field in the Two-transverse-Positions as in Fig 20-(2).

For Photons which force is \( F_{\text{photon}} = \frac{[\Theta \leftrightarrow \Theta]}{r} = \frac{[\sigma \sigma]}{r^2} = \frac{[\sigma]}{r}^2 = \frac{2\pi f}{\Phi} = \frac{2B}{\Phi \Phi} \) , issue above .

Since for Electron \( 4\pi^2 f_e^2 m_e = k = \pi g \), then for Gravity issues , \( - \nabla E = - \nabla g = 4\pi m_e f_e^2 \).

\[ \vec{q}_{\text{Photon}} = \frac{G}{\sqrt{2f}} = \frac{Gh}{\sqrt{2E}} = \frac{[6.680561.10^{-11}][6.62606957.10^{-34}]}{\sqrt{2}.E=1} = 3.13 \times 10^{-44} \text{ C} . \]

All above Physical Structures Vibrate , In-Sectors with minimum Energy , and form the \( \rightarrow \) Electron-charge \( \leftarrow \) In Surfaces with minimum Energy , and thus forming the Orbits .

The Orbit relation \( r^3 f^2 p = \text{Constant} \), as multiplication of Space-cave \( r \) and frequency \( f \), as the Energy , the Work \( \equiv \) motion , is conserved in orbit , \( r \), as the , \( n \), frequencies \( f_n \).

AKNOWLEDGE

Because of Covid-19 , was impossible for me to communicate with Professors or Electrical Engineers Specialists in Electromagnetism ubiquity. As is seen Frequencies or Energy and Electromagnetism is everywhere in nature from microcosm to macrocosm .The Relation of frequencies and Stresses becoming from the Eternal-motion of the Opposites which are the only elements of this cosmos , Drive us to the Energy - Space Constructions of everything existing in Objective-Reality . It was done an effort to frame the all document in Classical Mechanic so that the Reader can understand the Deep-meaning of equations . Articles [89] - [90] were intended for , Future Technology Journals , but because Nobody knows when Covid-19 is to be eliminated , so I decided to detach Parts and include in present believing that Present Revised [87R] , will Share this Knowledge of Electromagnetism into Material Geometry to all Readers , becoming from the One - Force of Energy-Space-Universes and which is that of Newton’s Gravitational-Constant G only . Markos Georgallides 1/3/2020.

Photon Particle , Photon Wave OR The Duality Photon ???
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